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# Wild and Scenic River Study Report and Draft Environmental Impact Statement on the Little Bighorn River



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# Wild and Scenic River Study Report and Draft Environmental Impact Statement on the Little Bighorn River

Sheridan County, Wyoming  
Bighorn National Forest

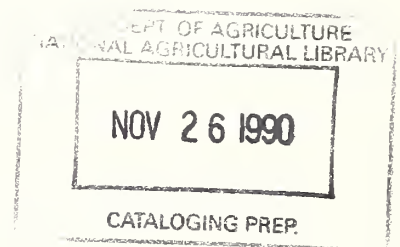
Lead Agency: USDA Forest Service

Responsible Official: Richard E. Lyng  
Secretary of Agriculture

Type of Environmental  
Impact Statement: Legislative

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## Abstract

This draft Wild and Scenic River Study Report/Environmental Impact Statement (EIS) documents the results of an analysis of three alternatives for future management of three segments of the Little Bighorn River. The entire study area is located in the Bighorn National Forest in northern Wyoming. The three segments were found eligible for inclusion in the Wild and Scenic Rivers System in the Bighorn National Forest Land and Resource Management Plan Final EIS. This Study Report/EIS discusses the potential classification and suitability of the eligible segments and identifies the environmental and socioeconomic effects of each alternative. The preferred alternative is Alternative 3, Designation of 16.9 Miles. Other alternatives considered are Alternative 1 (No Action), Unsuitable for Designation, and Alternative 2, Designation of 19.2 Miles. The actions considered are consistent with the Bighorn National Forest Land and Resource Management Plan.

Reviewers should provide the Forest Service with their comments during the review period of the draft Study Report/EIS. This will enable the Forest Service to analyze and respond to the comments at one time and to use information acquired in the preparation of the final EIS, thus avoiding undue delay in the decisionmaking process. Reviewers have an obligation to structure their participation in the National Environmental Policy Act (NEPA) process so that it is meaningful and alerts the agency to the reviewers' position and contentions, Vermont Yankee Nuclear Power Corp. v. NRDC, 435 U.S. 519, 553 (1978). Environmental objections that could have

been raised at the draft stage may be waived if not raised until after completion of the final EIS, Wisconsin Heritages, Inc., v. Harris, 490 F. Supp. 1334, 1338 (E.D. Wis. 1980). Comments on the draft EIS should be specific and should address the adequacy of the statement or the merits of the alternatives discussed (40 CFR 1503.3).

Comments can be sent to Arthur Bauer at the Sheridan, Wyoming, address shown above.



## Summary

The Bighorn National Forest Land and Resource Management Plan Final Environmental Impact Statement (EIS) determined that three segments of the Little Bighorn River (including the Dry Fork) are eligible for study for designation as part of the National Wild and Scenic Rivers System based on their free-flowing characteristics and outstandingly remarkable scenery. The EIS stated that a suitability study for designation should be conducted if a development proposal is received. A proposal to build a hydroelectric facility on the Dry Fork recently has been received, and the Forest Service consequently has prepared this report. This draft Study Report/EIS briefly summarizes and incorporates by reference the findings of eligibility documented in appendix F of the Bighorn National Forest Land and Resource Management Plan Final EIS (40 CFR 1502.21) and focuses on the potential classification and suitability of eligible segments within the study area for inclusion in the system. The entire study area is located within the Bighorn National Forest in northern Wyoming.

This Study Report/EIS is prepared pursuant to the Wild and Scenic Rivers Act, as amended; the National Environmental Policy Act of 1969 (NEPA), as amended; and related regulations and procedures. This Study Report/EIS is tiered to the Bighorn National Forest Land and Resource Management Plan Final EIS, and the actions considered are consistent with direction contained in the Forest Plan. The Forest Plan applied management area prescription 10D to the river study area as an interim measure to protect the values of the area until recommendations from this study are implemented. Under management area prescription 10D, the study area is managed essentially as a wild and scenic river.

The USDA Forest Service is the lead agency for conducting the environmental analysis and preparing this Study Report/EIS; however, the Secretary of Agriculture is the responsible official in this action. The Secretary will make recommendations to the President that none, all, or part of the study corridor should be designated as a component of the Wild and Scenic Rivers System. The final authority for designating wild and scenic rivers rests with Congress.

Several proposals for water development exist for the eligible segments of the Little Bighorn River corridor. To consider the full range of reasonably foreseeable potential uses of the land and water and the full range of potential effects under both suitable and unsuitable findings, chapter V of this Study Report/EIS discusses development scenarios that are based conceptually on these proposals. However, it should be emphasized that project-specific analysis of environmental and socioeconomic impacts of a particular development proposal is beyond the scope of this Study Report/EIS. (Further, project-specific information is not available at

this time to allow for such an analysis.) If all or part of the study area is dropped from consideration for inclusion in the Wild and Scenic Rivers System, the Forest Service will consider the impacts of specific proposals in project-specific environmental analyses after receiving applications and site-specific information from project proponents.

The study area includes a segment of the Little Bighorn River beginning one-half mile upstream of Dayton Gulch and continuing downstream to where the river leaves the Forest boundary and includes the Dry Fork from its confluence with Lake Creek to the Little Bighorn River (see figure 1). The entire study area lies on National Forest lands. Sheer canyon walls approximately 1,000 feet high are present throughout much of the corridor. The Little Bighorn River and the Dry Fork sustain trout fisheries of Statewide and regional importance. Principal wildlife in the study area includes elk, deer, black bear, moose, mountain lion, ruffed and blue grouse, and turkey.

The river is free flowing, although several water resource project applications are on file with the Wyoming State Engineer. The scenery of the area is considered outstanding and is characterized by towering, colorful cliffs, river gorges, and many series of rapids. Although the river itself is not floatable, recreationists use the area for hiking, hunting, and fishing.

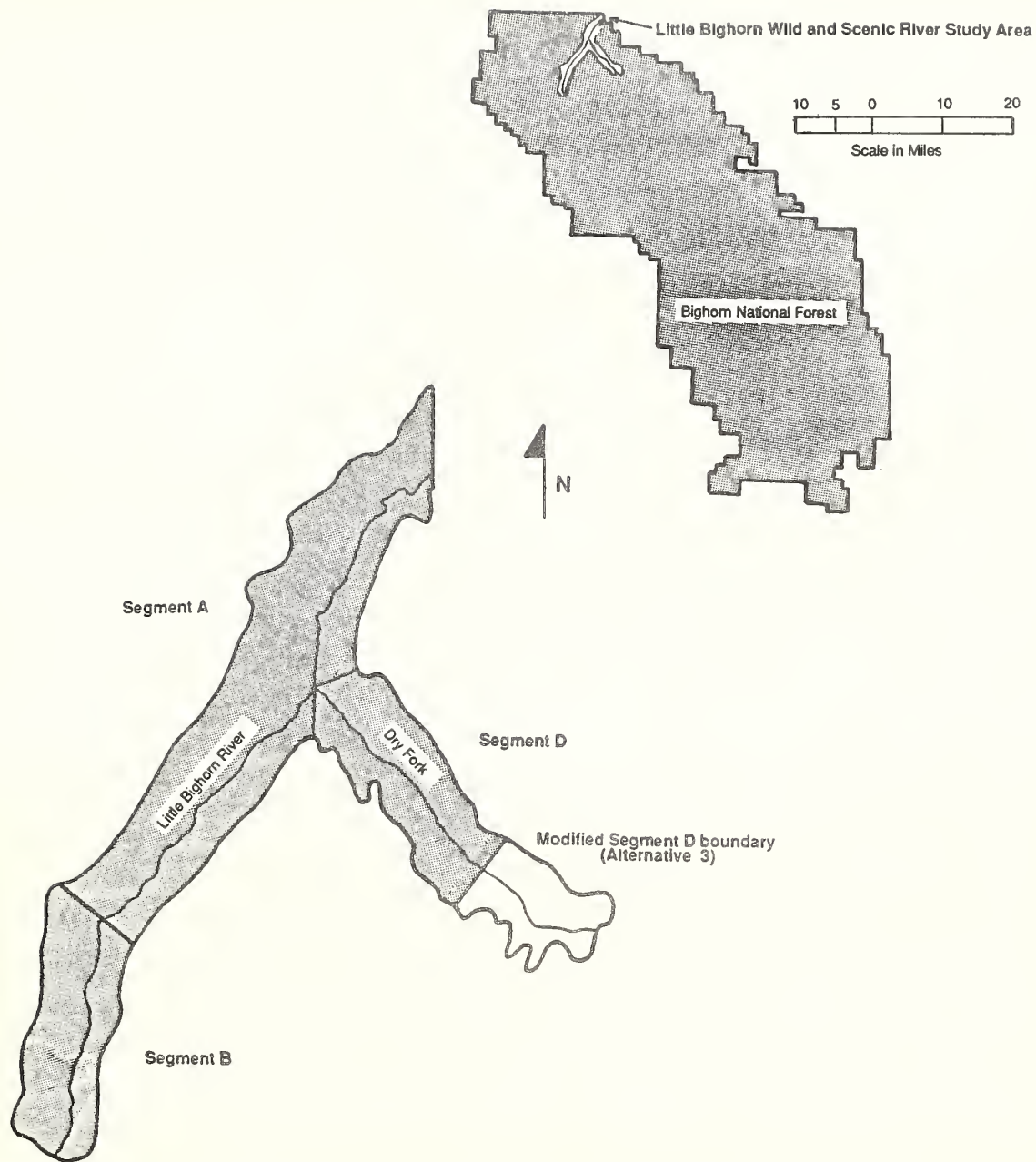
Three segments, each different in character, are considered in the environmental analysis and are included in this Study Report/EIS. Segment A encompasses the northern part of the Little Bighorn Canyon and extends 9.2 miles upstream from the Dry Fork Trail Bridge to Wagon Box Creek. Segment B covers the next 4 miles upstream between Wagon Box Creek and Fools Gold (Forest Development Road (FDR) 480) Crossing. Segment D extends 6 miles along the Dry Fork from its mouth upstream to its confluence with Lake Creek.

Three alternatives are considered. Implementation of Alternative 1 (No Action) means that the area is not recommended for designation under the Wild and Scenic Rivers Act, and new management area prescriptions that would replace the 10D interim status prescription would be applied to the area. Under Alternative 2, segments A and D are recommended for designation under a wild classification, and segment B is recommended under a scenic classification. Under Alternative 3, the same findings made under Alternative 2 are made, with one exception: the boundary for segment D is moved 2.3 miles downstream on the Dry Fork (see figure 1). Implementation of any of the alternatives will result in an amendment to the Forest Plan. The Record of Decision for this Study Report/EIS will serve the purpose of amending the Plan.

Table 1 at the end of this section summarizes the impacts of the three alternatives.

Under Alternative 1, the area would be managed under prescriptions 2A, 3B, 4B, 6A, and 6B. Other than the potential for water developments, the uses of the area would not change significantly from current uses. The level of dispersed recreation use would remain relatively constant. Assuming no





The entire area shown would be included in the Wild and Scenic Rivers system under Alternative 2. Under Alternative 3, the unshaded area in Segment D would not be included in the system.

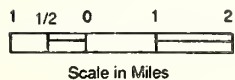


Figure 1--Location of the Study Area and Areas That Would Be Recommended for Designation Under Alternatives 2 and 3

water development occurs, there would be no significant effects on vegetation, soil, fish and wildlife, water, land use, visual resources, socioeconomics, or historical and cultural resources. If water developments were to occur under this alternative, potential impacts include effects on elk migration routes, localized effects on wildlife habitat and grazing areas, changes in water quality, and potential impacts to cultural uses by Native Americans. These potential impacts are analyzed for pumped storage and diversion project scenarios under Alternative 1 in chapter V.

Under Alternative 2, all 19.2 miles of the river corridor would be recommended for designation as part of the Wild and Scenic Rivers System. Because use of the river corridor is not expected to increase appreciably under this alternative, there would be minimal effects on vegetation, soil, fish and wildlife, water, adjacent land uses, visual resources, socioeconomics, or historical and cultural resources. The major difference between this alternative and Alternative 1 is that this alternative precludes the possibility of developments in the river corridor and the attendant potential impacts to migrating elk, the free-flowing characteristics of the river, water quality, and cultural uses of the area. Conversely, the potential for increased employment and income opportunities associated with developments in the area would be eliminated under this alternative.

The preferred alternative calls for protecting 16.9 miles of the Little Bighorn River as a wild and scenic river, while preserving the option for future consideration of development proposals in the remainder of the study area. As the preferred alternative, Alternative 3 maximizes public net benefits in an environmentally sound manner, as required in the National Forest Management Act regulations, 36 CFR 219.1(a).

Under the preferred alternative, recreation use levels are not projected to increase above the current estimated 12,000 RVD's of use per year in the designated portions of the corridor. There would be minimal effects on vegetation, soil, fish and wildlife, water, adjacent land uses, visual resources, or historical and cultural resources in the areas included in the system. No water development could occur in the designated areas. The undesignated portion of segment D would be managed with an emphasis on primitive recreation (prescription 3B) and livestock grazing (prescription 6B).

Under Alternative 3, less of the eligible area would be protected and available as a wild and scenic area, and water development on the excluded portion of the Dry Fork would remain an option for future consideration. Potential impacts of water development would be the same as those described under Alternative 1.

The Forest Service would not permit any development on the excluded portion of the Dry Fork unless careful site-specific analysis and development of mitigation measures by all involved agencies indicated that the desired downstream value and condition of the land could be maintained. This includes provisions for maintaining instream flows for stream channel maintenance and visual quality consistent with a wild classification.



Little Bighorn River near the National Forest boundary.

Table 1

## Summary of Environmental Consequences

Factors Considered	Alternative 1		
	Alternative 1 (No Action) Unsuitable for Designation Baseline Scenario	Unsuitable for Designation Pumped Storage Scenario <sup>1</sup>	Unsuitable for Designation Diversion Project Scenario <sup>1</sup>
Vegetation and Soil	No significant change from current environment.	Moderate impact to vegetation and soils in the project area. Vegetation and soils in reservoir areas would be permanently submerged.	Temporary minor impacts to narrow swath of vegetation and soil along pipeline pathway.
Fish and Wildlife	No significant change from current environment. Improvement of wildlife habitat in areas is managed under prescription 4B.	Potential short- and long-term effects on elk migration and grazing areas. The reservoirs would permanently displace wildlife. Wildlife would be disturbed in the short term by construction activities. Some portions of trout streams within the study area would be lost in the lower reservoir area. Water quality and impacts could affect aquatic habitat, but stream channel maintenance requirements and minimum flow requirements for fisheries would have to be met at all times.	Wildlife would be temporarily displaced from construction areas. Water quality and quantity impacts could affect aquatic habitat, but stream channel maintenance requirements and minimum flow requirements for fisheries would have to be met at all times.
Geology and Minerals	Potential for minerals is low. Mining would be allowed but only if conducted in a manner that minimizes surface disturbance, sedimentation, pollution, and visual impact.	Moderate impact in disturbed areas.	Minor impact in disturbed areas.

<sup>1</sup>These scenarios are not alternatives for analysis in this Study Report/EIS. Rather, they are presented to provide a summary of the general types of impacts and issues associated with pumped storage or diversion developments that may occur in the future under Alternative 1. The pumped storage scenario also would be possible under Alternative 3. If Alternative 1 or 3 is selected, site-specific impacts will be analyzed in a separate project-specific analysis if and when an application with project-specific data is received. The impacts of concurrent development would be the additive effects of both the pumped storage and diversion scenarios (see chapter 5).



Table 1 (continued)

## Summary of Environmental Consequences

Factors Considered	Alternative 1		Alternative 1	
	Alternative 1 (No Action) Unsuitable for Designation Baseline Scenario	Unsuitable for Designation Pumped Storage Scenario <sup>1</sup>	Unsuitable for Designation Diversion Project Scenario <sup>1</sup>	
Water Quantity and Quality	No impact. State and Federal instream criteria for water quality would apply. Water developments could be considered in the future, but decisions on permitting would be subject to project-specific environmental analysis.	Changes in downstream water quality could occur, particularly during construction. While filling the reservoirs, flow rates would be lower than normal. Following reservoir filling, flow rates would be similar to preproject rates. State and Federal water quality criteria and stream channel maintenance requirements would apply at all times.	There could be changes in downstream water quality, particularly during construction. Flows would be reduced downstream of the diversion site. State and Federal water quality criteria and stream channel maintenance requirements would apply at all times.	
Land Uses and Landownership	No significant change. All land in study area is federally owned. Rangeland would be improved in areas managed under prescription 6B.	Current land uses, including hiking, grazing, and wildlife habitat, would be precluded in submerged lower reservoir area (including part of West Pass Trail). The land would remain federally owned and managed.	Disturbances associated with construction of the pipeline could temporarily divert hikers and livestock from using that portion of the river corridor. The land would remain federally owned and managed.	
Access	No significant change.	Access to the study area would increase through construction of new roads and improvement of existing roads.	Access to the study area may increase, depending on final project design.	
Recreation	No significant change from current environment. Hiking, fishing, and hunting would continue to occur at the same use levels (approximately 12,000 recreation visitor days per year). Area would be managed for primitive and semiprimitive motorized and nonmotorized recreation.	No significant change from current overall use in the study area expected. Loss of trout stream in lower reservoir area would diminish fishing opportunities in the project area, but a lake fishery would be created. Big game hunting in the flooded areas would be precluded.	Only one segment of the trail area would be excavated at any one time. Hunting, fishing, and hiking opportunities would be slightly diminished in the construction area. Following completion of the project, recreation activities in this area should return to their prior levels.	



Table 1 (continued)

## Summary of Environmental Consequences

Factors Considered	Alternative 1 (No Action) Unsuitable for Designation Baseline Scenario		Alternative 1 Unsuitable for Designation Pumped Storage Scenario <sup>1</sup>		Alternative 1 Unsuitable for Designation Diversion Project Scenario <sup>1</sup>	
	No significant change from current environment.		Historic and cultural resources could be affected adversely by construction and flooding the lower reservoir within the study area. The State Historic Preservation Office requires a survey before approval of a project and may require certain mitigation measures to protect the sites. Medicinal plant gathering and vision quests by Native Americans would be precluded in the flooded lands and be less appealing in the immediate project area.		Historic and cultural resources could be affected by pipeline construction. The State Historic Preservation Office requires a survey before approval of a project and may require certain mitigation measures to protect the sites. Use of the project area by Native Americans for plant gathering or vision quests would be precluded during construction.	
Historic and Cultural Resources	No significant change from current environment.		Historic and cultural resources could be affected adversely by construction and flooding the lower reservoir within the study area. The State Historic Preservation Office requires a survey before approval of a project and may require certain mitigation measures to protect the sites. Medicinal plant gathering and vision quests by Native Americans would be precluded in the flooded lands and be less appealing in the immediate project area.		Historic and cultural resources could be affected by pipeline construction. The State Historic Preservation Office requires a survey before approval of a project and may require certain mitigation measures to protect the sites. Use of the project area by Native Americans for plant gathering or vision quests would be precluded during construction.	
Visual Resources	No significant change from current environment.		The natural scenery of the immediate project area would be permanently affected. The winding nature of Dry Fork and the mountainous terrain minimizes the extent of visual impact of the project.		Construction would temporarily diminish the scenic value of the land. Upon revegetation of the project area, the scenic values would be reestablished.	
Socioeconomics	No significant change from current socioeconomic environment.		The project would generate a significant increase in the tax base and employment for Sheridan County. Several hundred construction workers are projected to be employed for several years, with fewer permanently employed.		Depending on final project design, up to 200 workers are projected to be involved in various aspects of the project for about 1 year. A few persons would be permanently employed as a result of the project. The income generated from the revenues depends on the ultimate use of the water stored in the reservoir.	

Table 1 (continued)

## Summary of Environmental Consequences

	Alternative 2 Designation of the Entire Study Area (19.2 Miles)	Alternative 3 Designation of 16.9 Miles (Preferred)
Vegetation and Soil	No significant change from current environment. No timber harvest would occur in the future within segments A and D, although some clearing in support of recreation use and to protect the environment could be done. Timber harvest could occur within segment B provided there is no substantial adverse effect on the river and its immediate environment. Grazing use within the corridor would be limited to the amount presently practiced.	Impacts would be similar to those described in Alternative 2 for segments designated as wild or scenic. Impacts within the non-designated segment would be similar to those described in Alternative 1 baseline scenario or pumped storage scenario (should development occur). Before the approval of any projects in the nondesignated area, requirements of FERC, the Forest Service, and fish and wildlife agencies would have to be met by the project proponent, and it must be demonstrated that downstream wild and scenic values could be maintained before any project could be approved.
Fish and Wildlife	No significant change from current environment. Fish and wildlife values would continue to be protected in the future.	See above.
Geology and Minerals	New mining claims and mineral leases in segments A and D would be prohibited within 1/4 mile of the river. New claims and leases could be allowed in segment B. However, any mining operations must be conducted in a manner that minimizes surface disturbance, sedimentation, pollution, and visual impact and protects the wild and scenic values.	See above.
Water Quantity and Quality	No significant change from current environment. The river would remain free-flowing within the designated area. Water developments would be precluded from occurring within the designated area but could occur upstream from this area provided that a subsequent project-specific	See above.

Table 1 (continued)

## Summary of Environmental Consequences

	Alternative 2 Designation of the Entire Study Area (19.2 Miles)	Alternative 3 Designation of 16.9 Miles (Preferred)
Water Quantity and Quality (con't.)	environmental analysis demonstrates construction and operation to be compatible with management and values of the designated area. Developments could also occur downstream from the National Forest boundary without jurisdiction by the Forest Service.	
Land Uses and Landownership	No significant change from current environment. 13,280 acres and 19.2 river miles would be included in the Wild and Scenic Rivers System.	See above. 11,860 acres and 16.9 river miles would be included in the Wild and Scenic Rivers System.
Access	No significant change from current environment. Trailhead to the Little Bighorn Canyon would be improved.	See above.
Recreation	No significant change from current environment. Continued recreation use of the corridor would occur in the future. Hunting, fishing, and hiking are not expected to increase significantly above current use levels. Semiprimitive nonmotorized opportunities would be provided in segments A and D, and semiprimitive motorized and nonmotorized opportunities would be provided in segment B.	See above.
Historic and Cultural Resources	No significant change from current environment. Historic and cultural resource values would be protected in the future.	See above.
Visual Resources	No significant change from current environment. Visual resources values would be protected in the future.	See above.

Table 1 (continued)

Summary of Environmental Consequences

	Alternative 2 Designation of the Entire Study Area (19.2 Miles)	Alternative 3 Designation of 16.9 Miles (Preferred)
Socioeconomics	No significant change from current environment. Potential for values increased employment and income opportunities related to possible water development could not occur.	See above.





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## CHAPTER I

### Purpose of and Need for Action

In 1980, the National Heritage Conservation and Recreation Service recognized the National Forest portion of the Little Bighorn River as potentially eligible for inclusion in the Wild and Scenic Rivers System, and, in 1983, the USDA Forest Service Rocky Mountain Regional Guide included direction to study the eligibility of the Little Bighorn River. To be eligible for designation as a component of the National Wild and Scenic Rivers System, a river must be free flowing and the adjacent land must possess one or more outstandingly remarkable scenic, recreational, geological, fish and wildlife, historical, cultural, or other values. The final Environmental Impact Statement for the Bighorn National Forest Land and Resource Management Plan documents that three segments of the Little Bighorn River (including the Dry Fork) are eligible for designation under the Wild and Scenic Rivers Act and states that a suitability study should be conducted if a development proposal were received. A proposal to build a hydroelectric facility on the Dry Fork has been received, and the Forest Service consequently has prepared this Wild and Scenic River Study Report/Environmental Impact Statement (EIS), which focuses on the potential classification and suitability of the eligible segments within the study area for inclusion in the National Wild and Scenic Rivers System.

The Wild and Scenic Rivers Act provides for three classifications of rivers and river segments: wild, scenic, and recreational. Classification is based on the condition of the river and adjacent lands at the time of the study. (Eligibility criteria and classifications are discussed in more detail in chapter III.)

The determination of suitability provides the basis for the decision to recommend designation or nondesignation of the river. In the determination of suitability, the Wild and Scenic Rivers Act requires consideration of the following: the need for and applicability of protecting the outstanding values afforded by Wild and Scenic River designation; the current status of landownership; the reasonably foreseeable potential uses of the land and water in the river corridor that would be enhanced, foreclosed, or curtailed if the area were or were not included in the system; public, State, and local interest or opposition to designation of the river; the estimated costs of acquiring any necessary lands and administering the area; and other issues or concerns of the public.

Several water development projects have been proposed for the eligible segments of the Little Bighorn River corridor, although no final project design or site-specific information is available. To consider the impact of Wild and Scenic River designation on the reasonably foreseeable potential uses of the Little Bighorn River corridor, chapter V of this Study Report/EIS presents development scenarios that are based conceptually



on these proposals. However, it should be emphasized that project-specific analysis of environmental and socioeconomic impacts of a particular development proposal is beyond the scope of this Study Report/EIS, which considers alternatives regarding the suitability of the study area for inclusion in the Wild and Scenic Rivers System.

This Study Report/EIS is prepared pursuant to the Wild and Scenic Rivers Act (P.L. 90-542), as amended; the National Environmental Policy Act of 1969 (NEPA) (P.L. 91-190), as amended; the Council on Environmental Quality's regulations for implementing NEPA (40 CFR 1500-1508); and the Final Revised Guidelines for Eligibility, Classification, and Management of River Areas (47 FR 34457). It complies with the Forest Service's NEPA implementing procedures (FSM 1950), NEPA Procedures Handbook (FSH 1909.15), and Land and Resource Management Planning Handbook (FSH 1909.12), chapter 8. This Study Report/EIS is tiered to the Bighorn National Forest Land and Resource Management Plan and Final EIS, and the actions considered are consistent with direction contained in the Forest Plan. As an interim measure until this Study Report/EIS is completed, the Forest Plan applies management area prescription 10D to the river study area, which calls for protecting the wild and scenic values of the area. A decision to implement any of the alternatives considered will result in an amendment to the Forest Plan. The Record of Decision for this Study Report/EIS will serve as the amendment to the Plan.

In preparing this Study Report/EIS, the Forest Service has considered all relevant issues raised by the public during the scoping process. During scoping, two open houses were held in Sheridan, Wyoming, and three public forums were held in Sheridan, Wyoming; Lodge Grass, Montana; and Crow Agency, Montana. Comments received at these meetings and in writing were summarized in the Scoping Summary prepared by the Forest Service and distributed to all those who participated during scoping. The Scoping Summary is available for review at the Forest Supervisor's Office in Sheridan.

The Secretary of Agriculture will recommend to the President that none, all, or part of the study area should be designated as a component of the Wild and Scenic Rivers System, based on the findings in this Study Report/EIS. The final authority for designating wild and scenic rivers rests with Congress.

If the Little Bighorn River or segments of it are dropped from further consideration for potential designation, the Forest Service will consider the impacts of any specific development proposals in a separate project-specific environmental analysis after receiving applications and project-specific information from project proponents. Potential projects involving the development of waterways for interstate commerce also will have to go through Federal Energy Regulatory Commission (FERC) permitting and environmental analysis.

## CHAPTER II

### Description of the Study Area (The Affected Environment)

#### Regional Setting

The river corridor consists of approximately 13,280 acres located entirely within the Bighorn National Forest along the northern boundary of Wyoming (figure II-1). The corridor includes the Little Bighorn River from approximately one-half mile upstream of Dayton Gulch until it leaves the Bighorn National Forest boundary and includes the Dry Fork from its confluence with Lake Creek to the Little Bighorn River. The corridor extends an average of one-half mile from each bank of the Little Bighorn River and the Dry Fork. Downstream from the study area, the Little Bighorn River flows 1.8 miles through Wyoming, and approximately 65 miles through the Crow Indian reservation in Montana to its confluence with the Bighorn River near Hardin, Montana. The eligibility of the portion of the river that is outside of the National Forest has not been determined.

#### Physiography and Geology

The terrain and topography within and adjacent to the river corridor vary. Sheer canyon walls approximately 1,000 feet high are present throughout much of the corridor along the Little Bighorn River. Extremely steep talus slopes extend from the canyon walls to the river banks. The terrain within the corridor becomes more gentle, and the lower cliffs are interspersed with small river gorges upstream of the confluence of Wagon Box Creek and the Little Bighorn River. The topography of the Dry Fork portion of the corridor is similar to that of Little Bighorn Canyon but is broader and is rimmed by wide, flat benches below steep canyon walls to the east and steep timbered slopes to the west.

The gradient from the farthest reaches of the Little Bighorn River and the Dry Fork within the river corridor to the northern corridor boundary is 0.053 (3,710 feet over 13.2 miles) and 0.031 (1,670 feet over 10.3 miles), respectively. Water rushes rapidly over cobble- to boulder-sized rocks within the streambed. The major tributaries of the Little Bighorn River within the corridor include Taylor Creek, Wagon Box Creek, and Dayton Gulch. Bear Trap Creek, Lick Creek, and Lake Creek are the major tributaries of the Dry Fork.

The northern Bighorn Mountains were formed 40 to 70 million years ago. Granite older than 570 million years is exposed in the study area along the Little Bighorn River. Shale and limestone overlie most of the granite in this portion of the river corridor. Carbonate formations (dolomite and limestone) predominate in the Dry Fork and are underlain by shale, sandstone, conglomerate, and limestone beds. Overlying the carbonate

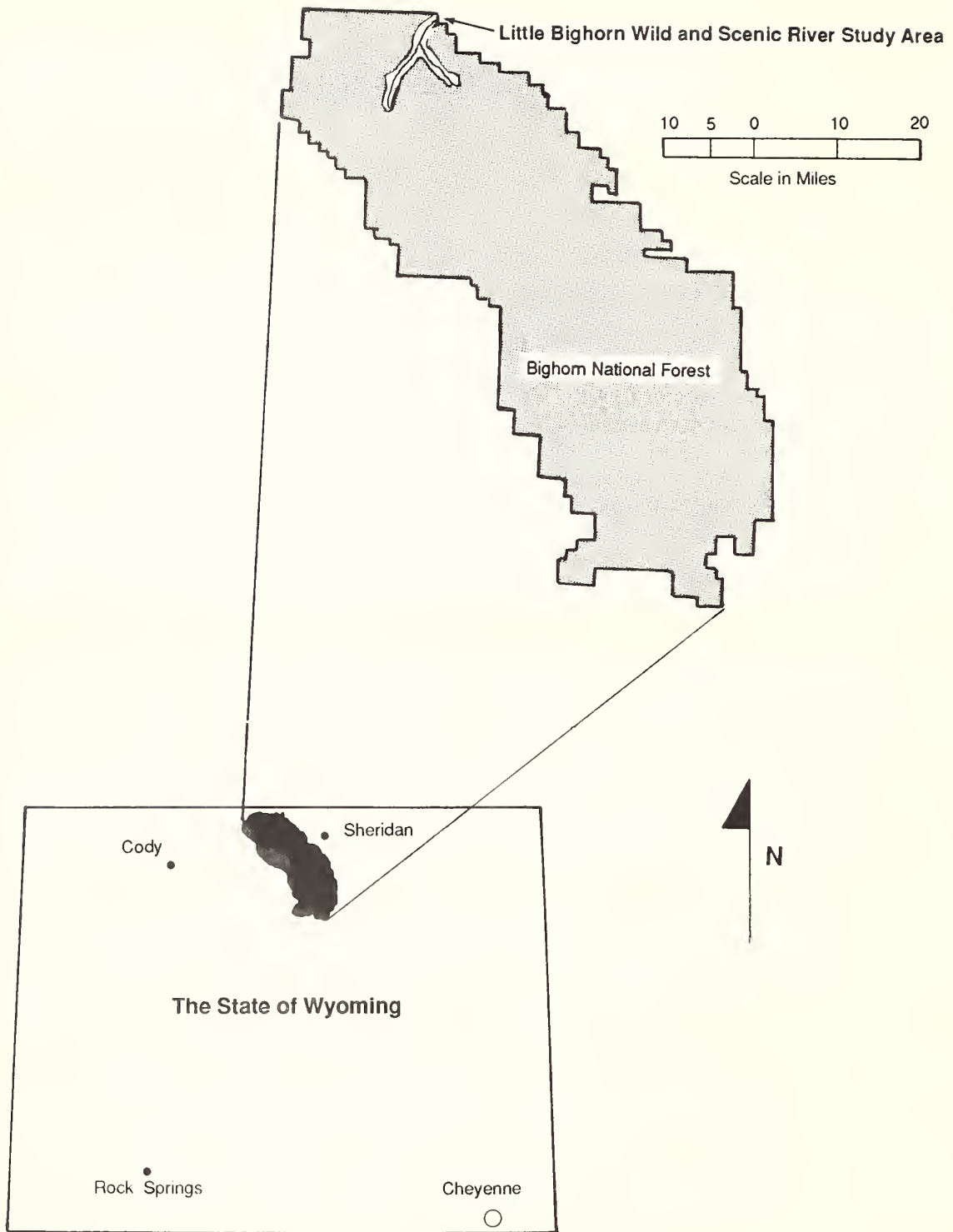


Figure II-1--Location of the Little Bighorn Wild and Scenic River Study Area

formations are younger rocks that are made up of limestone, dolomite, shale, and sandstone. Faulting has occurred in the corridor.

## **Vegetation and Soil**

Vegetation in the Bighorn National Forest varies with the elevation. The principal tree species near the mouth of the Little Bighorn River is ponderosa pine with mountain mahogany shrub covering the slopes. As the elevation increases upstream, ponderosa pine gives way to Douglas-fir and lodgepole pine. Farther upstream, large patches of Engelmann spruce and subalpine fir are surrounded by parks and grass-covered slopes. Douglas-fir is the dominant species in Dry Fork Canyon. The west slopes of the canyon are heavily forested, while open sagebrush areas are interspersed with forested areas on the east slopes. Small stands of aspen are scattered throughout the corridor and, although not common, have a high potential for management. Although no timber harvesting occurs within the study area, some harvesting areas are adjacent to the Little Bighorn River corridor. Streambank vegetation is relatively undisturbed. No threatened or endangered plant species are known to occur in the study area.

Soils on this part of the Forest are predominantly formed in colluvial material resulting from erosion. Because carbonate rock is the most common rock exposed in the study area, most of the soils are basic and high in nutrients. Some granite- and shale-derived soils, with less fertility, occur in certain areas. Rock outcrops, including escarpments, canyon walls, and mountain peaks in the study area, are exposed to the effects of weathering, which causes fragments of rock to break from the outcrops. These fragments generally move downslope at a slow rate that is occasionally punctuated by a sudden downward movement, a landslide. Results of a soil survey of Bighorn National Forest reveal a variety of soil types associated with colluvial material derived from rock outcrops (U.S. Department of Agriculture (USDA), 1986). Interpretation of aerial photographs has revealed a number of potential landslide areas within both the Little Bighorn and Dry Fork Canyons.

Soils that formed in material derived from interbedded shale, sandstone, and limestone on mountain slopes and landslide deposits occur in three separate areas of the study area: both banks of the Little Bighorn River below its confluence with the Dry Fork; the west bank of the Little Bighorn River approximately 2 miles upstream of its confluence with the Dry Fork to the southernmost extent of the river corridor; and the east bank of the Dry Fork south of its confluence with Lick Creek. The hazard for water erosion in these rock-soil assemblages is slight to moderate, and the limitations for unsurfaced roads range from moderate to severe (USDA, 1986).

## **Fish and Wildlife**

The Little Bighorn River has been rated as a Class II trout stream (one of Statewide importance) by the Wyoming Game and Fish Department, which manages the fishery resource of the Little Bighorn River within the majority



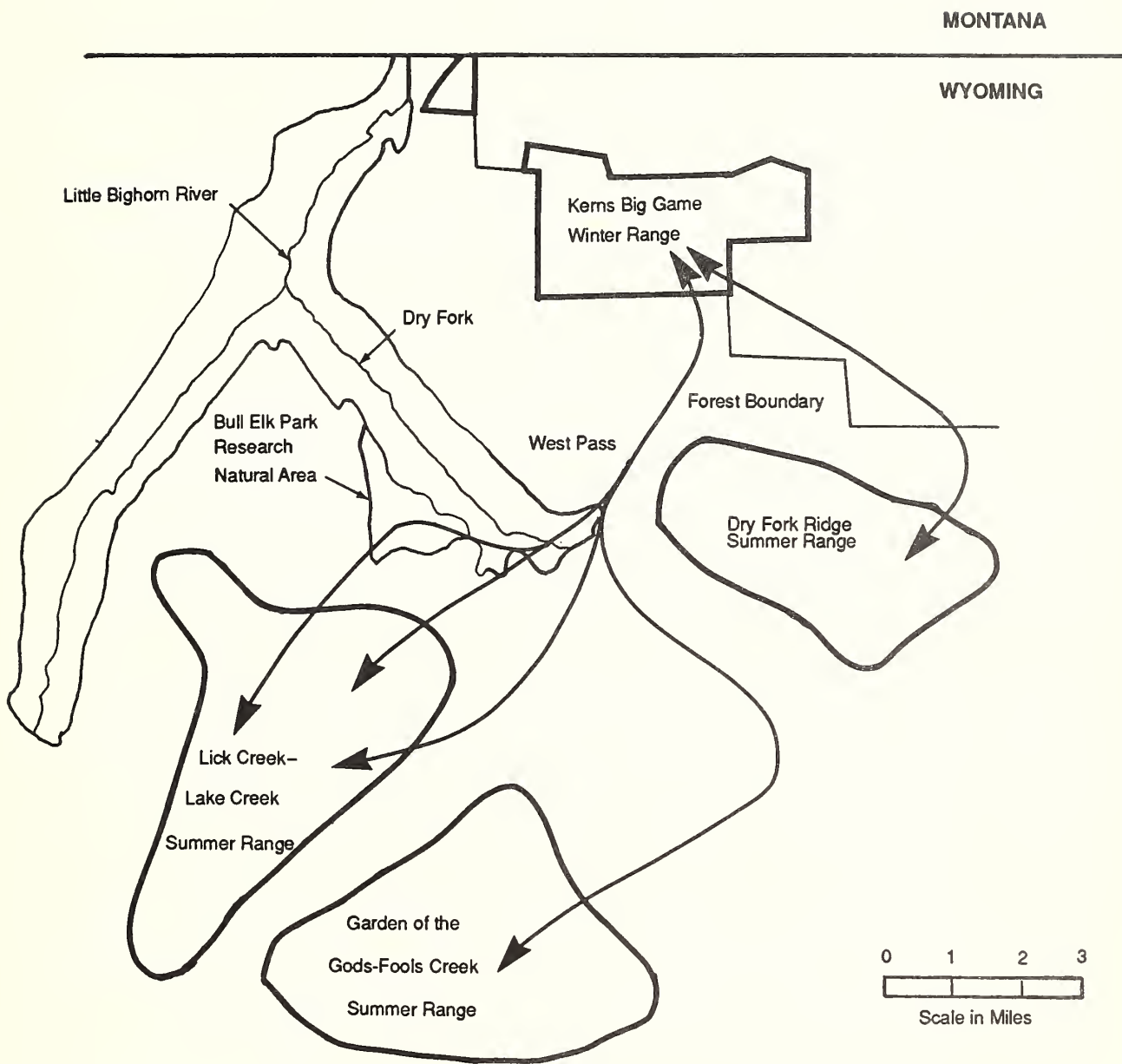
of the river corridor under the department's wild concept (Wyoming Game and Fish Department (WG&F), 1987a). The wild concept requires that the river support enough wild game fish to sustain a fishery without supplemental stocking. Only the extreme upper end of the river corridor at the junction of the Little Bighorn River with Half Ounce Creek is stocked with rainbow trout. The fishery resource of the Dry Fork is managed by the State as a Class III trout stream (one of regional importance) under the wild concept. A cutthroat fishery is maintained on Lick Creek 5 to 6 miles from its mouth (outside the study area). Rainbow trout is the most common game fish throughout the study area, with smaller populations of whitefish, brown trout, cutthroat trout, and brook trout in the Little Bighorn River and smaller populations of brook trout, cutthroat trout, and brown trout in the Dry Fork. Based on fish sampling, the estimated number of trout varied from approximately 350 to 1,270 per mile of stream at different sites (WG&F, 1987a). Fishing pressure is relatively low on the Dry Fork and the Little Bighorn River within the study area compared with the more accessible areas above Dayton Gulch, which are more heavily fished. It is estimated that the level of fishing on the Little Bighorn River from the Wyoming-Montana State line to Dayton Gulch is 143.8 fisherman days per mile annually and 63.4 fisherman days per mile annually on the Dry Fork fishery extending 6 miles from its mouth (oral communication, Robert McDowell, WG&F, January 1988).

Principal game species within the river corridor include elk, deer, black bear, moose, mountain lion, ruffed and blue grouse, and turkey. Elk is the dominant game species in the study area. The upper two-thirds of the Little Bighorn River corridor is spring, summer, and fall range for elk and supports approximately 150 to 200 animals (WG&F, 1987b). Most of these elk winter on the west slope of the Bighorn Mountains, including the west slope winter range in Montana known as the Garvin Basin. An estimated 400 of the approximately 650 elk that winter on the Kerns Big Game Winter Range east of the Forest use part of the corridor (written communication, Roger Wilson, Wildlife Management Coordinator, WG&F, District 3, October 2, 1987). From 350 to 400 elk move from the Kerns Pasture to West Pass Creek and the Dry Fork as soon as the snow melts and the first grass appears. They may use the Dry Fork for 1 to 3 weeks depending on snow melt rates.

Three summer ranges have been identified for elk migrating from the Kerns Range: Dry Fork Ridge, Garden of the Gods-Fools Creek area, and Lick Creek-Lake Creek area (Williams, 1984). Elk grazing on the Dry Fork Ridge summer range southeast of the corridor do not travel through the study area. Elk reach the two other areas primarily through West Pass and the southern portion of the Dry Fork corridor. About 50 to 100 of the elk on the Kerns Range use the Dry Fork drainage for calving, and an elk calving ground also is located in the southern reaches of the Little Bighorn River corridor (USDA, 1984). Figure II-2 shows elk ranges in the vicinity of the study area.

The number of deer, moose, black bears, and mountain lions within the corridor is small compared to the number of elk passing through or summering in the river corridor (written communication, Roger Wilson, WG&F, October 1987). Blue grouse are the most abundant game birds and occupy the whole study area; ruffed grouse, although rarer than blue grouse, have been sighted in the Little Bighorn River Canyon (written communication, Roger





Source: Williams, 1984.

Figure II-2--Elk Ranges and Migration Routes in the Vicinity of the Study Area

Wilson, Wildlife Management Coordinator, WG&F, District 3, October 2, 1987). Wild turkeys have been observed more frequently in recent years and apparently nest in the study area (written communication, Roger Wilson, WG&F, October 1987).

Although no threatened or endangered animal species are known to occupy the study area, bald eagles have been seen in the larger Forest area. However, no nesting or roosting sites have been identified on the Forest (U.S. Department of the Interior, 1987). No nesting pairs of peregrine falcons have been found on the Forest, although the sheer cliff walls of the canyons within the river corridor have been identified as suitable habitat.

## **Minerals**

A mineral-potential report contained in appendix L of the Bighorn National Forest Land and Resource Management Plan Final EIS revealed a low potential for locatable minerals, oil, and gas within and around the study area. Seven mining claims currently are held in the upper end of the Little Bighorn River near its confluence with Wagon Box Creek and Half Ounce Creek. There are no current permits or operating plans for minerals exploration within the corridor. The nearest known petroleum fields are approximately 30 miles east and 15 miles west of the Forest. The closest exploratory well was drilled about 5 miles west of Story, Wyoming.

Placer gold mining has occurred sporadically as far north as the Bald Mountain area south of the corridor since the late 1800's and continues today (USDA, 1984). Placer deposits of monazite (with 8.8-percent  $\text{ThO}_2$ ), ilmenite, zircon, and magnetite also have been found in the Bald Mountain area. Placer deposits migrate downstream; therefore, a low potential exists for these mineral resources within the study area.

There is a potential for uranium mineralization within the corridor. Small, high-grade uranium deposits are found in the Little Mountain area, approximately 25 miles west of the river corridor. The deposits occur in ancient caves that were formed approximately 320 million years ago between the Mississippian and Pennsylvanian Periods (McEldowney et al., 1977). Similar terrain for the same geologic unit that contains the Little Mountain deposits is exposed within the corridor (Vaag and Wise, 1985).

## **Stream Flow and Water Quality**

Water from the Little Bighorn River within the study area has not been developed to any extent. Upon leaving the corridor, about 45,000 acre-feet per year of Little Bighorn water has been appropriated by the State of Montana, primarily for irrigation purposes downriver (USDA, 1984). United States Geological Survey (USGS) gauging stations on the Little Bighorn River and the Dry Fork within the study area and on the Little Bighorn River below the Forest boundary have recorded flow rates for periods ranging from 4 to 46 years. (Table II-1 shows flow rates and annual yields monitored at three gauging stations between 1983 and 1986.)

Table II-1

Flow Rates of the Little Bighorn River and the Dry Fork  
Monitored at U.S. Geological Survey Stations

Station <sup>1</sup>	Water Year	Annual Flow Rate			Annual Water Yield (acre feet)	Mean Monthly Flow Rate <sup>2</sup> (cubic feet per second)											
		Mean	Low	High		Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
06288600 Little Bighorn below Dayton Gulch	1983	18.5	2.7	206	13,380	9.4	7.3	5.6	5.0	4.1	3.5	3.4	21.5	111	30.3	12.9	8.1
	1984	21.8	3.0	232	15,820	7.1	5.5	4.1	3.7	3.2	3.2	3.6	53.0	122	33.9	14.0	8.3
	1985	11.5	2.3	81.0	8,300	6.4	5.1	4.4	3.7	3.3	2.9	5.3	49.5	28.7	12.9	8.3	6.3
	1986	20.3	2.7	319	14,720	5.9	4.5	3.8	3.2	3.0	2.9	4.5	43.8	131	22.4	10.8	9.0
06288700 Dry Fork below Lick Creek	1983	48.1	16.0	261	34,850	31.5	26.8	25.2	23.5	21.0	19.6	21.8	63.2	179	83.8	47.2	34.9
	1984	60.6	14.0	338	43,980	29.6	25.4	23.4	22.3	20.3	19.2	22.4	135.0	239	97.7	52.7	40.1
	1985	31.3	18.0	79.0	22,630	33.6	29.9	26.6	24.4	21.8	20.6	24.4	54.5	48.6	35.9	29.3	24.8
	1986	44.7	16.0	276	32,370	23.3	21.9	21.9	21.0	19.2	18.5	27.5	76.5	176	61.7	38.0	31.1
06289000 Little Bighorn at State Line	1983	148	45.0	1,030	106,800	95.7	80.7	73.7	69.9	60.9	59.6	71.4	217	593	226	126	96.7
	1984	189	25.0	1,270	137,000	86.7	73.0	55.0	66.6	61.8	62.2	77.5	489	746	290	149	107
	1985	99.9	40.0	376	72,360	94.2	77.6	69.4	67.7	64.2	65.6	86.6	250	169	103	78.0	70.8
	1986	140	29.0	1,320	101,200	69.2	55.3	58.1	55.0	51.1	56.1	90.8	285	600	170	101	85.9

<sup>1</sup>Station 06288600 is located on the Little Bighorn River below Dayton Gulch near Burgess Junction, Wyoming; elevation of gauge is 8,240 feet above mean sea level. Station 06288700 is located on the Dry Fork below Lick Creek near Burgess Junction, Wyoming; elevation of gauge is 6,100 feet above mean sea level. Station 06289000 is located on the Little Bighorn River near the Wyoming-Montana State line; elevation of gauge is 4,450 feet above mean sea level.

<sup>2</sup>A water year extends from October 1 to September 30.

Source: U.S. Geological Survey (USGS) monitoring data for stations 06288600 and 06288700 is from USGS office in Cheyenne, Wyoming. USGS monitoring data for station 06289000 is from USGS office in Helena, Montana.

Although a number of applications are on file with the State of Wyoming for water resource projects originating within the corridor, only one permit (23955) has been approved (written communication, Skip Anderson, Water Rights Technician, State Engineer's Office, September 1987). This permit is for diversion of 150 cubic feet per second (ft<sup>3</sup>/s) from the Little Bighorn River approximately 2 miles upstream from the Forest boundary. Proposed projects within the corridor that are on file with the State are outlined in table II-2 and depicted in figure II-3. A preliminary Federal Energy Regulatory Commission (FERC) permit (Project No. 9338-000) has been issued for a number of water projects, including that proposed in Wyoming State permit 23955. No Forest Service permits have been issued for any of these applications on file with the State of Wyoming, and no applications have been submitted to the Forest Service.

Water quality of the drainage in the corridor is very good. Water quality has been monitored for a number of years at USGS station 06289000 on the Little Bighorn River approximately 2 miles downstream of the Forest boundary (table II-3). The river has the highest dissolved salts content of all major streams in the Bighorn Mountains because of the limestone geology and ground-water percolation through the limestone and discharge to the river. Suspended sediment concentrations average approximately 10 percent more than the Bighorn National Forest-wide averages but are not detrimental to trout fisheries.

Other sites sampled in the watershed have indicated similar results. Sampling by the Forest Service (USDA, 1987a) in conjunction with potential timber sales at Dayton Gulch, near its junction with the Little Bighorn River, revealed alkalinity and turbidity levels somewhat lower than those recorded at USGS Station 06289000 (120 to 140 micrograms per liter and 0.5 to 2.2 Jackson turbidity units, respectively). The maximum recorded alkalinity and turbidity in the Little Bighorn River just below Dayton Gulch was even lower than that recorded at the Dayton Gulch site. The pH values for all sites sampled average about 8.5.

## **Landownership and Developments**

All of the 13,280 acres in the study area are National Forest System lands. There are no State or private lands within the National Forest portion of the Little Bighorn watershed. Downstream from the study area, the river flows 1.8 miles through private land in Wyoming and approximately 65 miles through the Crow Indian reservation in Montana to its confluence with the Bighorn River near Hardin, Montana.

There are three recreation residences in the study area located near the National Forest boundary. These residences are under a Forest Service special use permit. There is also a cow camp within the river corridor (figure II-4), which consists of a cabin, a 220-acre horse pasture, and a corral. In addition, there are USGS stream-gauging stations on the Dry Fork at the Lick Creek confluence and on the Little Bighorn River below Dayton Gulch. These are the only developments, other than transportation facilities, within the study area.

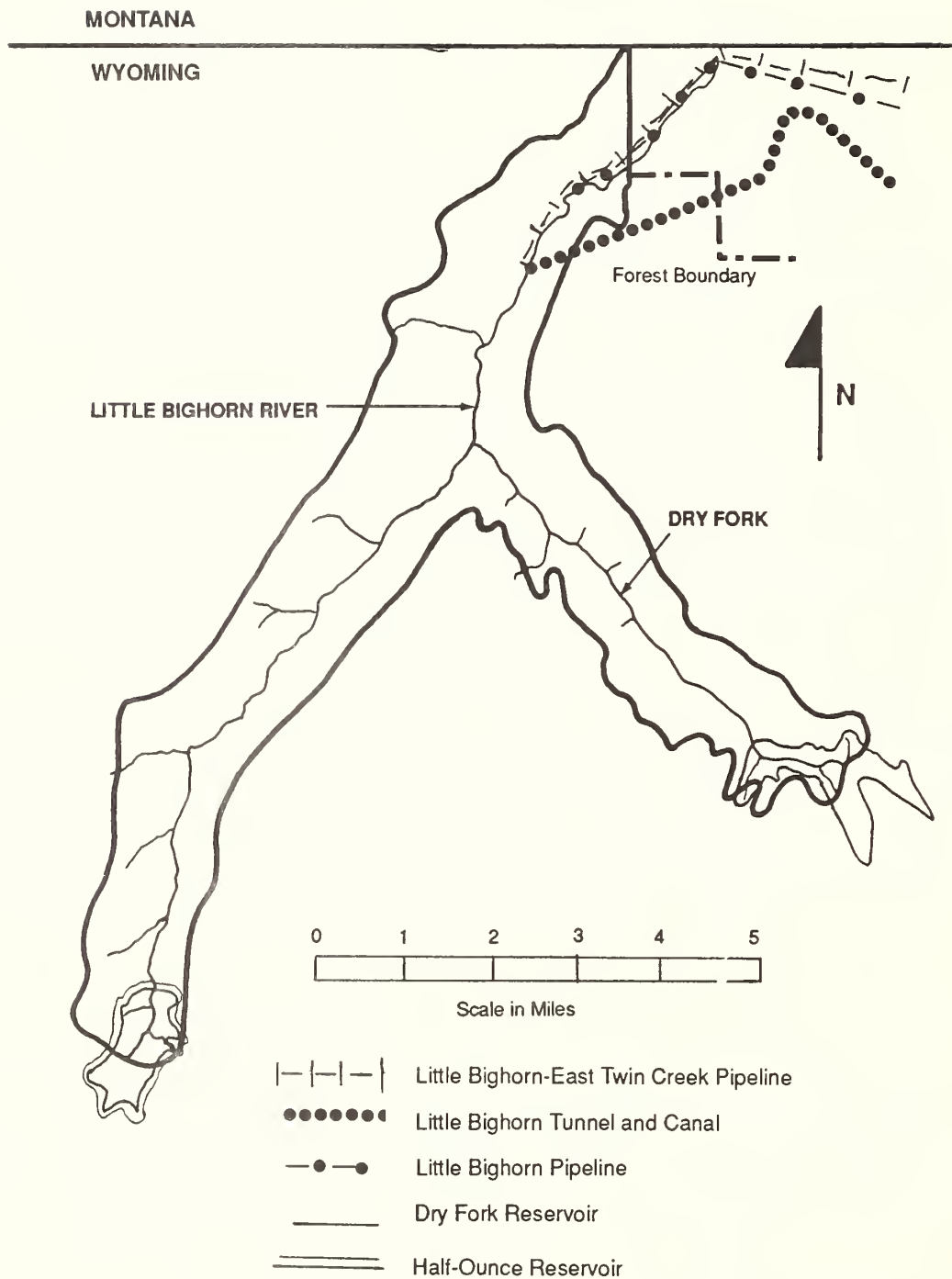
Table II-2

## Water Projects Within the Study Area Proposed to the State of Wyoming

Number	Date Received	Project	Current Permit Holder	Status
Temporary Filing Number 21 2/141 and Permit Number 23955	08/25/72	Little Bighorn-East Twin Creek Pipeline	Little Horn Water Group	Approved. The facility may not be completed because all notices have not been filed.
Temporary Filing Number 22 5/157	03/29/76	Little Bighorn Tunnel and Canal	Little Horn Water Group	Application on file but not yet approved.
Temporary Filing Number 23 1/258	02/08/80	Little Bighorn Pipeline	Fuller Ranch Company	Application on file but not yet approved.
Temporary Filing Number 23 2/364	10/24/80	Dry Fork Reservoir	Little Horn Water Group	Application on file but not yet approved.
Temporary Filing Number 23 3/364	10/24/80	Half-Ounce Reservoir	Little Horn Water Group	Application on file but not yet approved.

Source: Written communication, Skip Anderson, Water Rights Technician, Wyoming State Engineer's Office, September 18, 1987.





Note: Pipelines and Canal continue eastward to proposed reservoirs approximately 10 miles away.

Figure II-3--Water Developments for Which Applications Are on File

Table II-3

## Water Quality of the Little Bighorn River

Station <sup>1</sup>	Year	Water Temperature (°C)		Turbidity (JTU) <sup>2</sup>		Conductivity (Micromhos)		Dissolved Oxygen (mg/L) <sup>3</sup>		pH <sup>4</sup>		Alkalinity <sup>5</sup> (mg/L CaCO <sub>3</sub> )	
		Mean	Maximum	Minimum	Mean	Maximum	Minimum	Mean	Maximum	Minimum	Mean	Maximum	Minimum
06289000	1970	6.7	8.3	5.0	45.0	45.0	-6	-	6.0	6.0	8.5	8.5	152.0
	1971	10.0	12.2	7.8	2.8	5.0	1.0	-	10.0	10.0	8.2	8.4	173.7
	1972	8.8	12.2	6.7	3.0	9.0	0.0	230.0	300.0	130.0	8.5	8.6	130.0
	1973	9.8	13.3	6.1	11.1	34.5	0.0	337.5	370.0	305.0	-	-	140.0
	1974	7.2	8.9	5.0	-	-	-	273.3	300.0	230.0	-	-	123.3
	1975	7.8	10.0	4.4	8.0	15.0	2.0	306.0	325.0	290.0	10.6	12.0	160.0
	1976	10.1	13.3	8.3	1.3	5.0	0.0	150.4	274.0	30.0	1.1	1.1	172.5
1977	8.7	13.3	4.4	7.4	45.0	0.0	251.0	370.0	30.0	9.2	12.0	1.1	152.6

<sup>1</sup>Station 0628900 is located on the Little Bighorn River near the Wyoming-Montana State line; elevation of gauge is 4,450 feet above mean sea level.

<sup>2</sup>JTU = Jackson turbidity unit, which measures relative opaqueness to light.

<sup>3</sup>mg/L = milligrams per liter.

<sup>4</sup>EPA-recommended instream concentration for fish and aquatic life is 6.5 to 9.0.

<sup>5</sup>EPA-recommended instream concentration for fish and aquatic life is greater than 20 mg/L of calcium carbonate (CaCO<sub>3</sub>).

6- Not sampled.

Note: Except for sampling done in 1977, the maximum number of samples taken during any given year was four.

Source: Stret water database for station 06289000; data retrieved March 11, 1981.

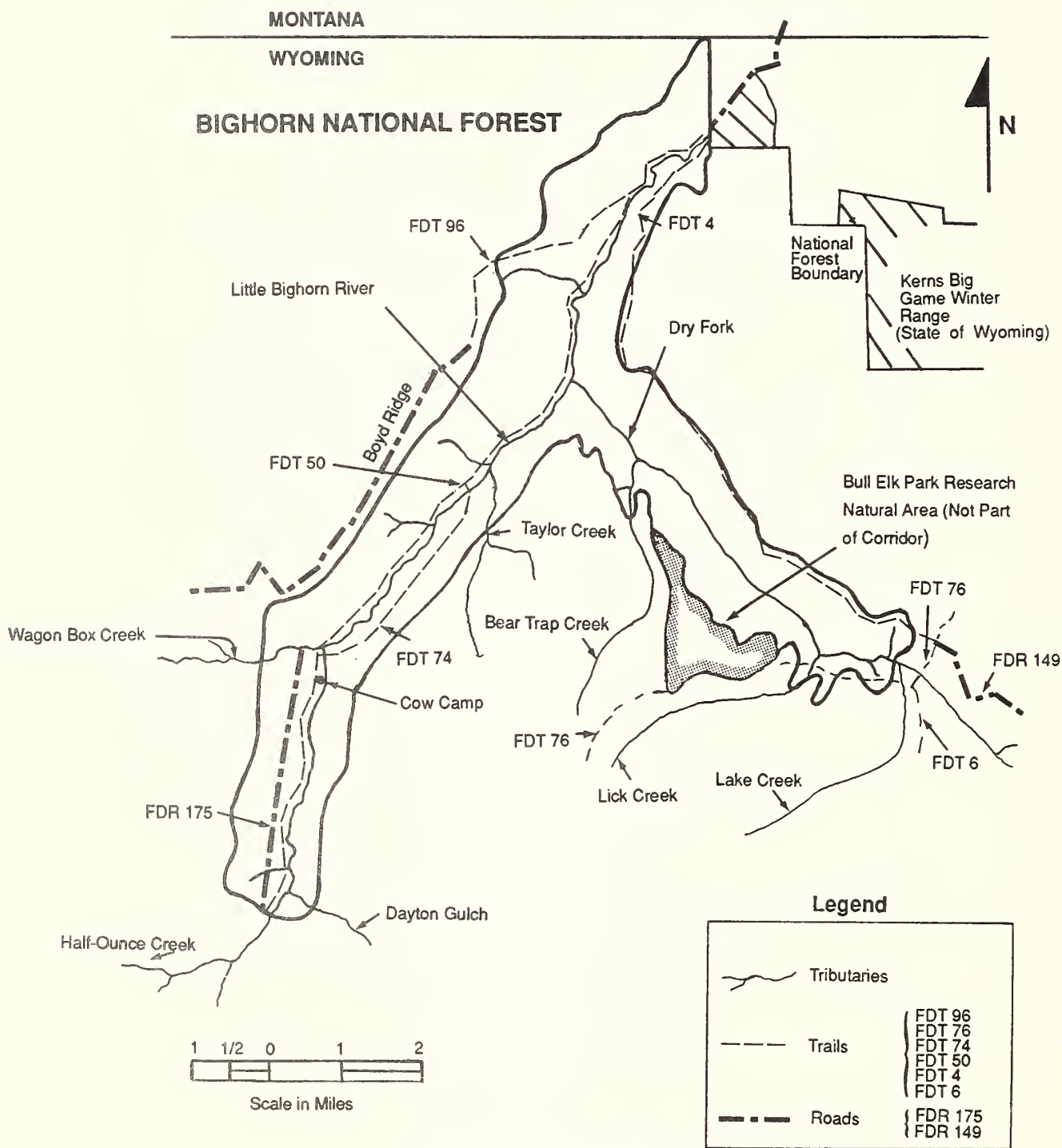


Figure II-4--Features of the Study Area



Recreation 1 mile upstream from Leaky Mountain.

## **Livestock Grazing**

Cattle and horses graze within the study area from late June to early October. Approximately 1,900 cattle and 40 horses are permitted to use the Little Bighorn stock driveway (FDT 50, see figure II-4). Approximately 2,500 cattle and 40 horses are authorized by 14 permits to graze on 7 range allotments, each of which includes a portion of the river corridor (USDA, 1987b).

## **Access**

Several system roads and trails are within or adjacent to the study area and provide access to the area (figure II-4). No motorized vehicles are allowed on trails within the study area. The Little Bighorn Trail (FDT 50) runs parallel to the Little Bighorn River to its junction with Wagon Box Creek. Boyd Ridge Trail (FDT 96) diverts from the Little Bighorn Trail and leaves the river corridor. Within the study corridor, four-wheel-drive roads exist along the river south of Wagon Box Creek and along Dayton Gulch. The Fuller Trail (FDT 74) extends from the Little Bighorn Trail across a trail bridge at Robinson's Crossing and intersects the Little Bighorn Road (FDR 175).



Access to the Dry Fork is limited. A trail bridge marks the beginning of the Dry Fork Trail (FDT 4) in the northernmost portion of the corridor. The Dry Fork Trail follows the Little Bighorn River until it branches along the Dry Fork and eventually climbs to the top of Dry Fork Canyon. Bull Elk Park Trail (FDT 76) traverses the corridor leading to Bull Elk Park. There is no other developed access to the banks of the Dry Fork.

Access to the southern portions of the corridor can be gained through Bighorn National Forest lands by U.S. Highway 14 to all-weather roads that lead to four-wheel-drive roads. The northern portion of the corridor is reached along a four-wheel-drive road that passes, in part, through Crow Indian lands in Montana and private land in Wyoming. Legal public access to the trailhead area has been granted to the Wyoming Game and Fish Department through the Little Bighorn Right-of-Way Deed and Agreement.

## **Recreation**

The major recreational activities within the study area include fishing, hunting, hiking, and horseback riding. The river is not floatable. A number of outfitters organize occasional hunting trips in the study area for big game, such as elk, moose, black bear, and mountain lion.

Recreation opportunities provided in the surrounding areas of the Bighorn National Forest include, but are not limited to, hiking, picnicking, fishing, hunting, camping, trailbiking, skiing, and snowmobiling. Although other recreation areas are available off the Forest, the Bighorn Mountains offer an environment strikingly different than the surrounding semiarid and desert areas. Demand for dispersed recreation, which includes all recreational activities that occur outside of developed sites and wilderness, has increased recently and is expected to rise proportionally with the population of the surrounding area. The management direction contained in chapter 3 of the Bighorn National Forest Land and Resource Management Plan emphasizes dispersed and developed recreation activities throughout the Forest to correspond with projected demand.

## **Other Rivers in the Region**

Existing components of the National Wild and Scenic Rivers System within 300 miles of the Little Bighorn study area include segments of the Missouri River in Montana, the Salmon River in Idaho, and the Cache la Poudre River in Colorado. Segments of rivers within this radius that have been studied for inclusion in the system include the Clarks Fork, North-Platte, Snake, Sweetwater, and Encampment Rivers in Wyoming and the Big Thompson, Elk, Green, and Yampa Rivers in Colorado. The Tongue River, also located on the Bighorn National Forest, was determined to be eligible for study in the Forest Plan but has not yet been studied for inclusion.



## Historic and Cultural Resources

This portion of the Bighorn National Forest historically was used by the Cheyenne, Sioux, and Crow Indians for sustenance and ceremonial purposes. Additionally, because rivers served as natural access routes for prehistoric people, the likelihood of significant sites in the corridor is high (Wyoming State Historic Preservation Office, 1987).

The Wyoming State Archaeologist performed a Class I literature search for documentation of cultural resources within 3 miles on either side of the eligible segments. The result of the search was a listing of surveys conducted in conjunction with timber sales in areas adjacent to the study area that revealed a variety of site types, time periods, and locations (Eckles, 1987). Among the prehistoric sites, there are a number of quarry locations where knappable stone raw materials are available, and several small camp or limited-activity-type locations were found both in ridge top and drainage bottom settings. Several sites contain stone circles and/or stone features, and one consists of a wooden lodge (wickiup) and a possible animal trap/corral/drive line. The historic sites include a mining camp and one with structural remains (perhaps a residential area).

Without specific site data, the kinds or densities of sites within the study area boundaries are difficult to predict. Given the data gathered from surrounding areas, it is expected that a number of prehistoric sites could be found along the terraces of the Little Bighorn River and on ridge tops and slopes above drainages. These probably would include lithic scatters (prehistoric rock tools such as axes, arrow points, etc.) of various sizes, from small flakes representing limited activity areas to large camps representing residential areas. Buried and stratified prehistoric sites are expected to occur in the study area. Small quarry locations similar to those found in the surrounding areas also are expected. Wooden structures such as lodge or corral/drive lines may be found but probably would be in higher elevations in timbered areas above the larger drainages. Historic mining and stock-raising related sites also could be expected to be found in the study area.

## Visual Resources

Scenic and visual resources within the study corridor are considered outstandingly remarkable as characterized by the towering, colorful cliffs rising above the river, the river gorges, and the many series of rapids. Leaky Mountain is a well-known sight visible from the Little Bighorn Trail, and Hidden Spring is also within the confines of the corridor. The twisting, swift-flowing nature of the Little Bighorn River and the Dry Fork cascading over rocks creates an esthetic environment. Trees prevalent in the lower reaches of the canyons give way to rock cliffs at higher elevations. Vegetation types that vary with elevation also enhance the scenery. The view down the Little Bighorn River and the Dry Fork from the upper reaches of the river corridor is spectacular. Winding trails along the river's edge provide a constant change in the scenic vista. Traces of

wildlife are obvious to many observant visitors to the study area, some of whom visit solely to observe an elk or to see a moose in its natural habitat.

## **Socioeconomics**

The Tongue-Sheridan Human Resource Unit (HRU) described in chapter 2 of the Forest Plan would be the area most likely impacted by wild and scenic designation or by any developments occurring within the study area and the surrounding area. Farming, ranching, coal mining, tourism, and recreational activities are the major sources of income in the Tongue-Sheridan HRU. Coal mining was the dominant activity in the area until the market for railroad fuel diminished after World War II. The production of coal-fired electrical generating plants in the 1970's provided a new market for coal, and extensive surface mines were opened. Mining in the area is on the downswing, however, because of the projected closing of the Big Horn Mine in Sheridan County during 1988 (Sheridan County Economic Development Council (SCEDC), 1987). No major new mines are anticipated for construction in the next 10-year period (USDA, 1984). Tourism and recreational activities are expected to remain at constant levels or to increase in the near future. The Bighorn National Forest serves many recreational needs of residents throughout the HRU and is considered a major attraction in drawing new residents to the area.

The Crow Indian Reservation in Montana, north of the Tongue-Sheridan HRU, relies primarily on farming and ranching for income. Approximately 6,000 Crow Indians live on the reservation. There are extensive coal deposits within the reservation, but these have not yet been developed.

The population of Sheridan County increased from approximately 18,000 to 25,000 from 1970 to 1980. Growth has been slower since 1980 with approximately 27,400 people living in the county in 1985 (SCEDC, 1987). The average yearly household income (2.6 persons) in the county for 1986 was \$20,657, which was equivalent to a per capita income of \$7,902. Unemployment of the county's labor force, which has been increasing since 1980, reached 7.9 percent in 1986 (SCEDC, 1987). According to 1980 census data, the three largest categories of the labor force in Sheridan County were agriculture/forestry/fishery/mining (18.6 percent), retail trade (17.5 percent), and construction (11.5 percent) (SCEDC, 1987).



Outstanding scenery within the Little Bighorn Canyon river corridor.





## CHAPTER III

### Findings of Eligibility and Classification

#### Eligibility

The Wild and Scenic Rivers Act and the Interagency Guidelines for Eligibility, Classification, and Management of River Areas (47 FR 39454, September 7, 1982) provide direction for determining the eligibility and classification of study rivers. To be considered eligible for inclusion under the Wild and Scenic Rivers Act, a river or river segment must meet several criteria. It must be free flowing and the adjacent land must possess one or more outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other values, including ecological values.

The Bighorn National Forest Land and Resource Management Plan Final EIS, Appendix F, documents the evaluation of five segments of the Little Bighorn River, each different in character, for eligibility (see figure III-1). The eligibility study included public involvement during the scoping and review of the EIS. Segments A, B, and D were found to be eligible based on their free-flowing characteristics and outstandingly remarkable scenery. Management area prescription 10D was applied to these segments so they would be managed essentially as parts of a wild and scenic river to protect their eligibility characteristics until this suitability study is completed. Standards and guidelines under management area prescription 10D are listed on pages III-229 through III-237 of the Forest Plan. Segment A encompasses the northern part of the Little Bighorn Canyon and extends 9.2 miles upstream from the Dry Fork Trail Bridge to Wagon Box Creek. Segment B covers the next 4 miles upstream between Wagon Box Creek and Fools Gold (FDR 480) Crossing. Segment D extends 6 miles along the Dry Fork from its mouth upstream to its confluence with Lake Creek.

Segments C and E are located at the headwaters of the Little Bighorn River and the Dry Fork. These two segments did not meet the eligibility criteria because, while they are free flowing, the scenery within these segments has been modified, and the river corridor does not have any other outstanding features or values. Therefore, segments C and E are not subject to further study. If all or part of the downstream eligible segments are included in the Wild and Scenic Rivers System, the upstream ineligible segments would be managed so as not to diminish the values of the designated wild and scenic river.

#### Classification

There are three classifications of rivers or river segments in the National Wild and Scenic Rivers System--wild, scenic, and recreational. Classification is based on the condition of the river and the adjacent



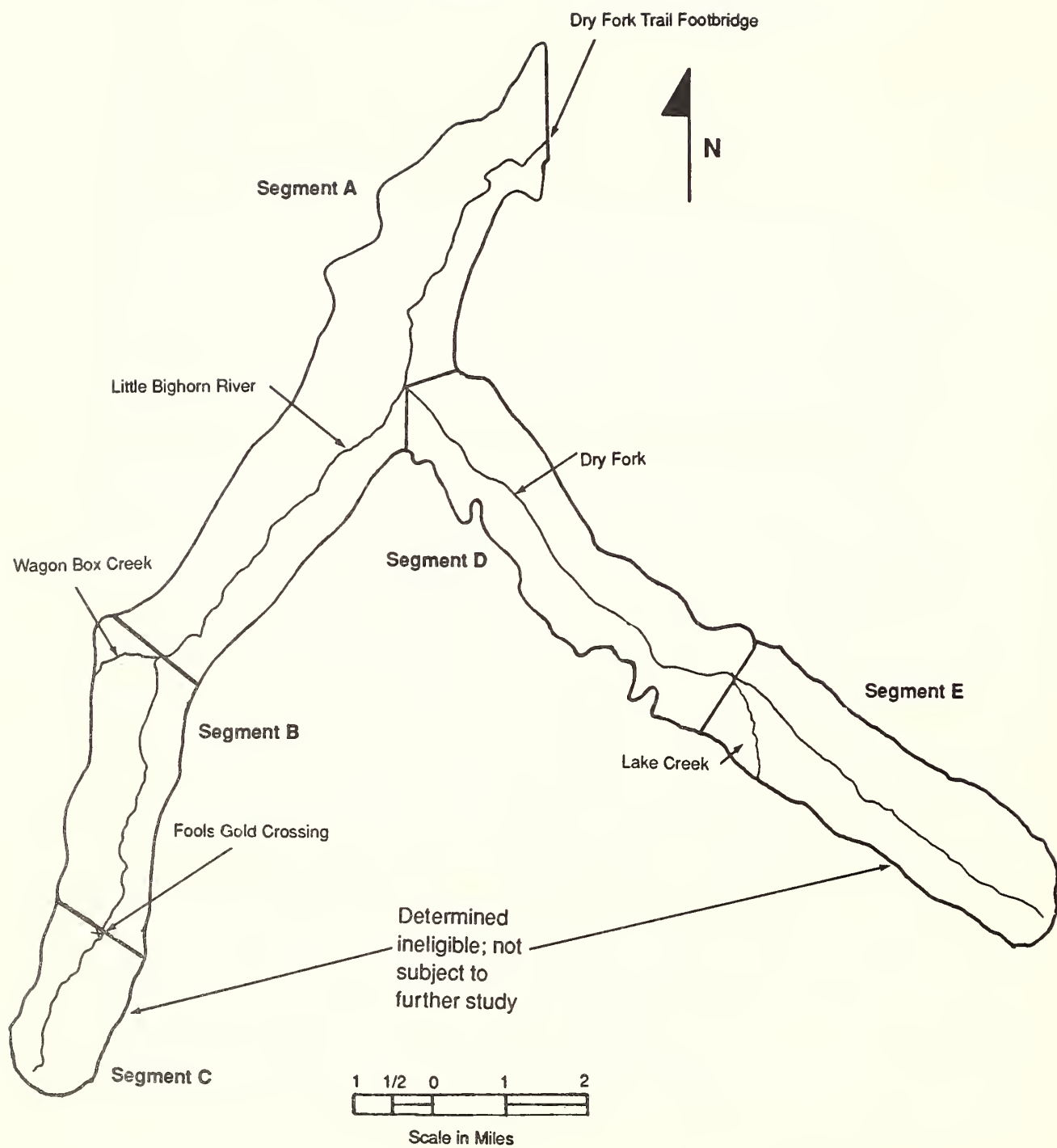


Figure III-1--Five Segments Originally Studied for Eligibility

lands at the time of the study. The act defines these classifications as follows:

1. Wild River. "Those rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. These represent vestiges of primitive America."
2. Scenic River. "Those rivers or sections of rivers that are free of impoundments, with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads."
3. Recreational River. "Those rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past."

Based on these classification criteria, segments A and D are eligible for classification as wild. These two segments are free of impoundments and are generally inaccessible, except by trail. A four-wheel-drive road leads to the mouth of the canyon at the Fuller Ranch on the northernmost boundary of segment A, and the Boyd Ridge four-wheel-drive road parallels the southwestern boundary of segment A. Another four-wheel-drive road leads to the cow camp at the boundary of segment D. Figure II-3 in chapter II illustrates roads, trails, and other land use features within and surrounding the study area.

The shorelines of segments A and D are essentially primitive. At the mouth of the canyon in segment A, three recreation residences with low standard driveways are under special use permits from the Forest Service. A cabin belonging to the Wyoming Game and Fish Department lies just outside segment A and is visible from within the segment. Grazing activities and livestock fences on the range allotments are the only other activities and structures evident within segment A. Within segment D, there is no evidence of human activity, grazing, timber harvest, or structures other than the U.S. Geological Survey stream gauging station on the Dry Fork below Lick Creek. The water quality of segments A and D meets stream concentrations recommended by the Environmental Protection Agency (EPA) for fish and aquatic life (see table II-1 in chapter II).

Segment B is eligible for classification as scenic. This segment is free of impoundments and is accessible by Burgess Road, which skirts the segment B boundary at Dayton Gulch. Other trails and roads paralleling or within segment B are shown in figure II-3 in chapter II. A four-wheel-drive road parallels the river within segment B. A short trail segment cuts across the southern tip of segment B at Dayton Gulch, and two short trails lead off the four-wheel-drive road into the cow camp within segment B. The shorelines are essentially undeveloped in segment B, and the only evidence



View of the Little Bighorn River on segment A approximately one-half mile upstream from the Forest boundary.



Little Bighorn Meadows at upper end of segment B.





View of the upper end of the Dry Fork in segment D just below the confluence with Lick Creek.

of activity is the U.S. Geological Survey gauging station below Dayton Gulch, the cow camp in the northern portion, and livestock fences and grazing on range allotments.

These classifications represent the highest classification levels for which these segments are eligible and afford the highest level of protection for maintaining the river in its current condition.





## CHAPTER IV

### Alternatives, Including the Proposed Action

Three alternatives regarding the suitability or unsuitability of including segments A, B, and D of the Little Bighorn River study area in the National Wild and Scenic Rivers System have been developed and analyzed. Implementation of Alternative 1 (No Action) would mean that the area would not be recommended for designation, and the Forest Plan would be amended to include management area prescriptions that would replace the 10D interim status prescription. Under Alternative 2, segments A and D would be recommended for designation under a wild classification and segment B would be recommended under a scenic classification. Under Alternative 3, the same findings made under Alternative 2 would be made, with the following exception: the upper boundary for segment D would be moved 2.3 miles downstream from the boundary as shown in Alternative 2. This would reduce the length of the suitable segment of the Dry Fork (segment D) from 6.0 miles to 3.7 miles.

Factors considered in determining the river's suitability include: (1) the current status of land ownership, including the amount of private land involved; (2) the reasonably foreseeable potential uses of the land and water that would be enhanced, foreclosed, or curtailed if the area were included in the system; (3) the values that may be foreclosed or diminished if the area is not protected as part of the system; (4) public, State, and local interest in the designation of the river; (5) cost of acquisition and administration of the area if it is added to the system; and (6) other issues and concerns identified during planning.

In developing alternatives, the Forest Service has considered all relevant issues that the public raised during scoping. Several of the alternatives developed during scoping were eliminated from further study because they address issues, such as eligibility of other areas, that are beyond the scope of this EIS. These alternatives and the reasons for their elimination are discussed in the following paragraphs. For an alternative to remain available for detailed consideration, it must relate to the scope of this EIS: the suitability or unsuitability of the study area for inclusion in the Wild and Scenic Rivers System. The remainder of this chapter addresses the alternatives that were considered in detail. The alternatives considered in detail reflect pertinent issues, conditions, and needs, and provide for a full range of reasonable uses for the study area as required by NEPA and chapter 8 of the Forest Service's Land and Resource Management Planning Handbook. Table IV-2, at the end of this chapter, summarizes the environmental consequences of the alternatives.

## Alternatives Eliminated From Detailed Study

### Optimization Alternatives

During initial scoping meetings with the public, it was recommended that the Forest Service consider alternatives that would optimize employment, optimize the tax base, optimize recreational opportunities, allow optimum use and reliance on the United States' natural resources, optimize development of existing fisheries, and maximize the protection of all plants and wildlife.

The consideration of any of these optimization alternatives was eliminated from detailed study. While no one alternative can optimize all of the resources described above, each of the alternatives optimize some of these resources within the context of the suitability issue. To consider alternatives strictly from the framework of optimizing specific resources (such as fisheries development) is beyond the scope of this Study Report/EIS. The alternatives considered address the management of all (multiple) resources in the study area with different emphases.

### Acquisition of Private Lands

Another alternative recommended during the public scoping meetings involved the acquisition of private lands between the Forest boundary and the Wyoming-Montana State line. This alternative has been eliminated from detailed study for several reasons. There is a considerable amount of development (bridges, recreation homes, roads, irrigation structures) between the Forest boundary and the Wyoming-Montana State line. Acquisition of private lands is unnecessary to gain access to segment A of the river corridor because the adjacent landowner has provided permanent, public, vehicular access to the Little Bighorn Canyon trailhead across his lands. Finally, the study of eligible segments previously was completed during the Forest planning process and therefore is beyond the scope of this Study Report/EIS. No public comment was made regarding the need to acquire additional lands outside the Forest boundary during the determination of eligible segments in the Forest planning process.

### Management Similar to the Cloud Peak Primitive Area

Some commentators recommended that the Little Bighorn study area be managed in the same way that the Cloud Peak Primitive Area was managed before its designation as a wilderness area in 1984. The Little Bighorn area was evaluated previously for wilderness designation in the Roadless Area Review and Evaluation Number II (RARE II) process but was not selected for wilderness (which is managed essentially the same as a primitive area) or for further study as potential wilderness. The Wyoming Wilderness Act of 1984 set the boundary of the Cloud Peak Wilderness Area and other wilderness areas in the State. It also released the lands on the Bighorn National Forest not designated as wilderness to be managed for multiple uses other than wilderness. However, under the alternatives considered in detail, all or segments of the Little Bighorn River study area would provide primitive or semiprimitive dispersed recreation opportunities such as those provided on the Cloud Peak Wilderness.

## Oil and Gas Opportunities

One commentor recommended an alternative that would not preclude the opportunity for oil and gas discovery, extraction, and rights of way. This opportunity is provided under Alternative 1, which finds the study area unsuitable for designation. Thus, a separate alternative to achieve this effect is not necessary. In addition, it should be noted that new mining claims and mineral leases can be allowed under the scenic classification, provided that the uses are conducted in a manner that minimizes surface disturbance, sedimentation, pollution, and visual impact and preserves the outstanding values. Consideration of this as a separate alternative thus has been eliminated from detailed study.

## Expansion of the Study Area

It was recommended that the Forest Service consider an alternative that would consider all drainages, springs, and other water sources that eventually flow northward into the Crow Reservation for inclusion in the system. The determination of which segments of the Little Bighorn study area were eligible for inclusion in the system was made during the Forest planning process and included public participation during scoping and review of the Bighorn National Forest Land and Resource Management Plan Final EIS. During that process, no one commented that additional areas within the Little Bighorn drainage should be examined for eligibility. The eligibility study has been completed (see appendix F of the Bighorn National Forest Land and Resource Management Plan Final EIS), and this Study Report/EIS evaluates those areas found to be eligible. Thus, an alternative regarding additional areas of eligibility has been eliminated from detailed study.

## Designation of Segments A and B

As part of this study, the Forest Service originally considered evaluating an alternative that would recommend segments A and B for designation and not recommend segment D. During scoping, the public commentors who suggested that all of segment D should be excluded from the system referred to provisions for development opportunities at the upper end of segment D. The effect of this alternative--to incorporate some eligible portions of the Little Bighorn River into the Wild and Scenic Rivers System, while still allowing for future consideration of development projects on the upper end of the Dry Fork segment--is accomplished by Alternative 3. Eliminating the additional river channel along segment D from consideration does not offer any additional opportunities not available under the other alternatives. Thus, this alternative was eliminated from detailed study.

## **Alternatives Considered in Detail**

### Alternative 1 (No Action)--Unsuitable for Designation

Under this alternative, the study area would be found unsuitable for designation. Management area prescription 10D, which provides protection for the river corridor while it is being studied, would be removed, and



other management area prescriptions would be applied. Figure IV-1 shows the management area prescriptions for different land areas within the study area that would be applied under Alternative 1.

Most of the study area (approximately 78 percent) in segments A and D would be managed under prescription 3B, which emphasizes primitive recreation (hiking, camping, and the like) in essentially natural settings away from mechanized human activities. Approximately 13 percent of the study area, including the upper part of segment A and the east banks and lower portion of segment B, would be managed under prescription 4B, which emphasizes wildlife habitat management. Semiprimitive motorized (four-wheel-drive vehicles on the Little Bighorn road in segment B) and nonmotorized recreation opportunities would be provided. Vegetation manipulation and human activities would be managed to provide optimum habitat for the selected indicator species (elk and trout). The west bank of segment B and a small area in segment D (together constituting approximately 8 percent of the study area) would be managed under prescription 6B, which emphasizes improving and/or maintaining rangeland conditions. Other management area prescriptions that would be applied under this alternative are 2A, Semiprimitive Motorized Recreation, to allow for parking space and driveways at recreation residences in a small area at the trailhead in segment A; and 6A, Livestock Forage Improvement, in the extreme lower portion of segment B. Management area prescription 1A applies to the summer homes in the study area, and 9A applies to all riparian areas. Management area prescriptions 1A and 9A are not portrayed on figure IV-1. (Chapter 3 of the Bighorn National Forest Land and Resource Management Plan describes specific standards and guidelines that would apply under each management area prescription.)

A finding of unsuitability would preclude the resource protection opportunities afforded by designation into the National Wild and Scenic Rivers System. However, development and use of the area would be managed by the Forest Service in conformance with the Forest Plan. The area would be managed similarly to adjacent areas; it would be available for grazing, primitive recreation, semiprimitive motorized and nonmotorized recreation, and wildlife habitat management. Mining would be allowed if permit conditions and stipulations were met.

Very few improvements are projected to be needed within the study area under Alternative 1, and administration costs would not increase significantly over current levels. The parking lot at the Little Bighorn Canyon trailhead probably would be improved to accommodate 15 cars for hikers and other recreationists. (The lot currently has approximately 6 spaces.) The estimated cost of tree removal and grading needed to improve this parking lot would be \$2,500. Access to the Little Bighorn Canyon trailhead in the northern portion of segment A is ensured through permanent, public, vehicular access provided by the Little Bighorn Canyon four-wheel-drive road across private property within the Crow Indian Reservation. The Little Bighorn four-wheel-drive road in segment B would remain available for use, although no new roads or trails are planned.

Under this alternative, the Forest Service would consider proposals for water developments or any other developments in the area on a project-specific basis. If project-specific analysis by the Forest Service and

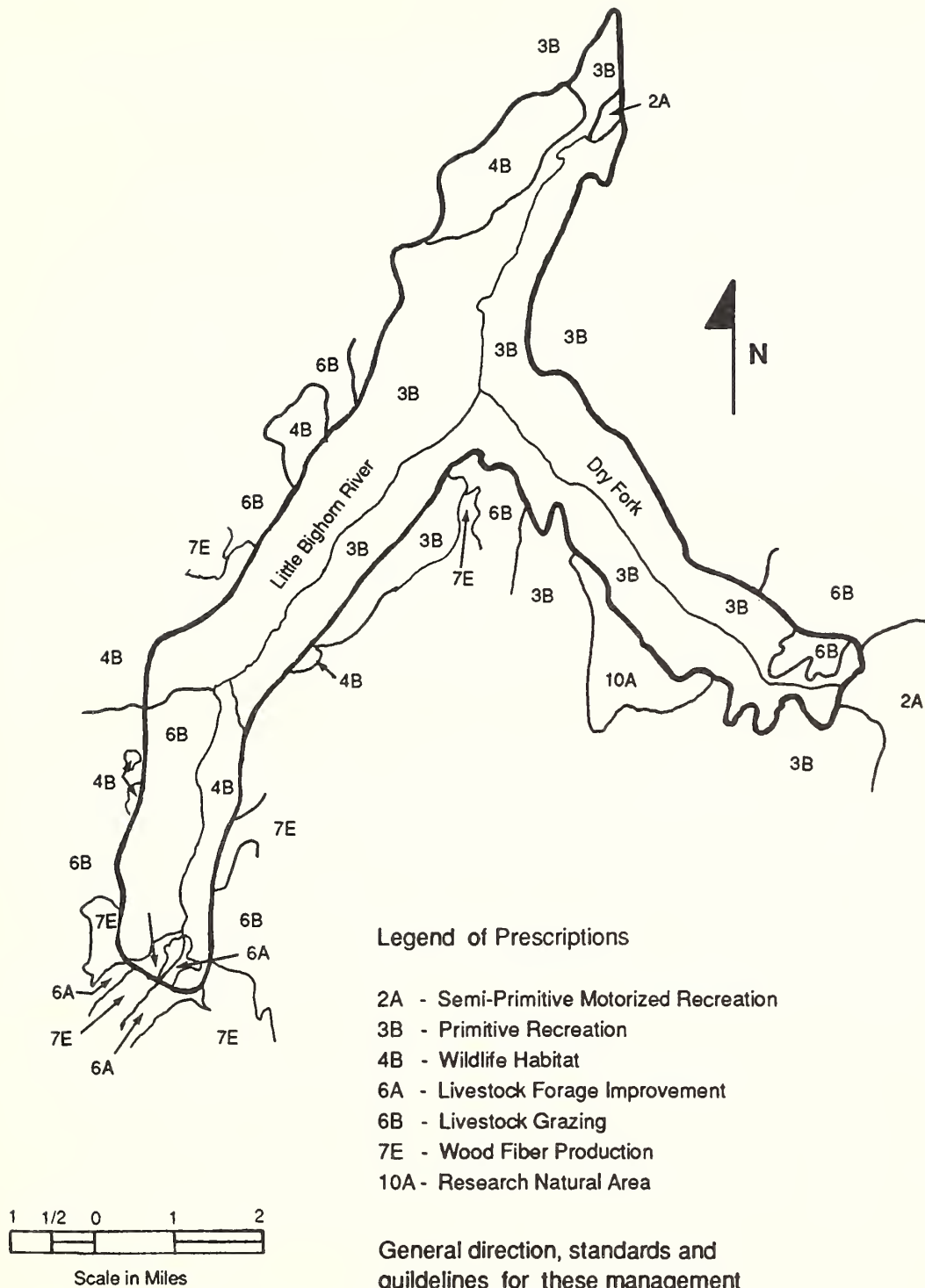


Figure IV-1--Management Area Prescriptions That Would Apply Under Alternative 1 (No Action)



other agencies involved (such as the Federal Energy Regulatory Commission (FERC)) determined the proposed use to be compatible with National Forest objectives and public interest, another management area prescription may be applied to the affected area at that time.

#### Alternative 2--Designation of the Entire Study Area (19.2 miles)

Under this alternative, segments A and D would be found suitable for designation under a wild classification, and segment B would be found suitable under a scenic classification (figure IV-1). A total of 19.2 river miles and approximately 13,280 acres would be found suitable under this alternative. These classifications represent the highest classification level for which each segment is eligible, and they afford the highest degree of protection for each segment. A recreation classification was not considered because the river is not floatable, and a recreation classification would not protect the outstanding values of the river corridor.

The boundaries of the study area were developed to follow topographic features and trails, and they generally extend one-half mile on either side of the river. The proposed lateral boundaries have been chosen to be consistent with the protection of the outstanding scenic values of canyon areas in segments A and D and the more gently sloping areas in segment B.

No water supply dams, flood control projects, major diversions, or hydroelectric power facilities would be permitted in segments A, B, or D. Such developments could occur upstream from the designated area provided that a subsequent project-specific environmental analysis demonstrates construction and operation to be compatible with management and values of the designated area. Instream flow requirements would be necessary in order to meet the objective of the Wild and Scenic Rivers Act to not unreasonably diminish the scenic, recreational, and fish and wildlife values. These requirements are shown in table IV-1. A wild and scenic river designation would have no effect on project proposals downstream from the designated river segment.

Under the wild classification, cutting trees would not be permitted in segments A and D except when needed for a primitive recreation experience (such as clearing for trails and protecting users) or to protect the environment (such as fire control). Timber outside the boundary but within view of the area would be managed and harvested in a manner to provide special emphasis on visual quality. New mining claims and mineral leases would be prohibited within one-quarter mile of the river, although valid claims would not be abrogated.

No new roads or provisions for motorized travel would be permitted, although the Boyd Ridge four-wheel-drive trail that parallels the southwestern boundary outside of segment A and the four-wheel-drive trails that lead to the boundaries of segments A and D would remain available for access. Agricultural use would be restricted to the amount of livestock grazing that is currently practiced in segments A and D. Simple recreation developments, such as comfort facilities, fireplaces, or shelters, could be provided as necessary, but they would harmonize with the surroundings.

Table IV-1  
Instream Flow Requirements<sup>1</sup>

Stream	Hydrologic Period	Approximate Dates	Average Stream Flow <sup>2</sup> (cfs)	Instream Flow Requirements	
				Average Amount Required (cfs)	Percent of Total Flow <sup>3</sup> (cfs)
Dry Fork	Rise	5/11-6/1	89	80	90
below Lick	Bank full	6/2-6/7	245	219	89
Creek	Recede	6/8-6/28	164	126	77
	Base flow	6/29-5/10	42	22	52
Little	Rise	5/25-6/9	94	74	79
Bighorn	Bank full	6/10-6/12	200	158	79
River	Recede	6/13-6/21	118	67	57
below	Base flow	6/22-5/24	16	8	50
Dayton					
Gulch					

<sup>1</sup>Differences in stream geomorphology of the Dry Fork and the Little Bighorn River necessitate different flow regimes to maintain channel stability.

<sup>2</sup>Based on 1986 season data.

<sup>3</sup>Instream flow requirements on the Dry Fork equal 83 percent of the total average annual flow in cfs. This equates to 62 percent of the total average annual flow in acre-feet. Instream flow requirements on the Little Bighorn equal 72 percent of the total average annual flow in cfs, or 66 percent of the total average annual flow in acre-feet. These instream flow requirements account for (1) minimum fisheries flows, (2) channel maintenance requirements, and (3) visual quality values.

Outfitter-guiding special-use permits could continue to be issued throughout the study area as long as the uses are compatible with the river's values and the river management plan.

Existing structures, such as the special-use permitted recreation residences and the livestock fences in segment A, would be allowed because they are consistent with the essentially primitive and natural values of the area. New structures would not be allowed except in rare instances to achieve management objectives, such as fisheries enhancement programs. New transmission lines, gas lines, or water lines would be discouraged as directed in the Forest Service Land and Resource Management Planning Handbook (FSH 1909.12), chapter 8. The Forest Service is aware of the Western Utility Group's Western Regional Corridor study, which addresses the potential for a utility corridor that traverses the study area. Before allowing any such development in a wild and scenic river area, the Forest Service would review this and other potential developments for compatibility with the management plan for the river area.

Under the scenic classification, silvicultural practices could be allowed in segment B provided that they were carried out in such a way that there were no substantial adverse effects on the river corridor. Timber outside the study area but within view of the area would be managed to provide special emphasis on visual quality.

New mining claims and mineral leases could be allowed, and existing mineral operations could continue as long as the activities were conducted in a manner that minimized surface disturbance, sedimentation, pollution, and visual impact.

Short stretches of conspicuous roads or longer stretches of inconspicuous roads, such as the Little Bighorn four-wheel-drive road, could be allowed in segment B. Grazing activities, livestock fences, and the cow camp located in segment B would be allowed to remain as long as there were no substantial adverse effects on the natural appearance of the river area.

Under the scenic classification, recreational facilities, such as moderately sized campgrounds, public information centers, and administrative headquarters, would be allowed in segment B if structures were screened from the river. (At this time, no such facilities would be considered necessary.) Any concentrations of residences would be limited to relatively short reaches of the river corridor. New structures that would have a direct or adverse effect on the river values would not be allowed. New transmission lines, gas lines, and water lines would be discouraged.

The Forest Service would administer all three segments because they lie entirely on National Forest System lands. A river management plan would be developed at an estimated cost to the Federal Government of \$40,000. The improvements to the Little Bighorn Canyon trailhead and parking lot would be made at the same cost as discussed under Alternative 1, \$2,500. At this time, no other improvements are projected to be needed if the study area is designated as part of the system. Annual administrative and maintenance costs are estimated to be \$10,000.

### Alternative 3--Designation of 16.9 Miles (Preferred Alternative)

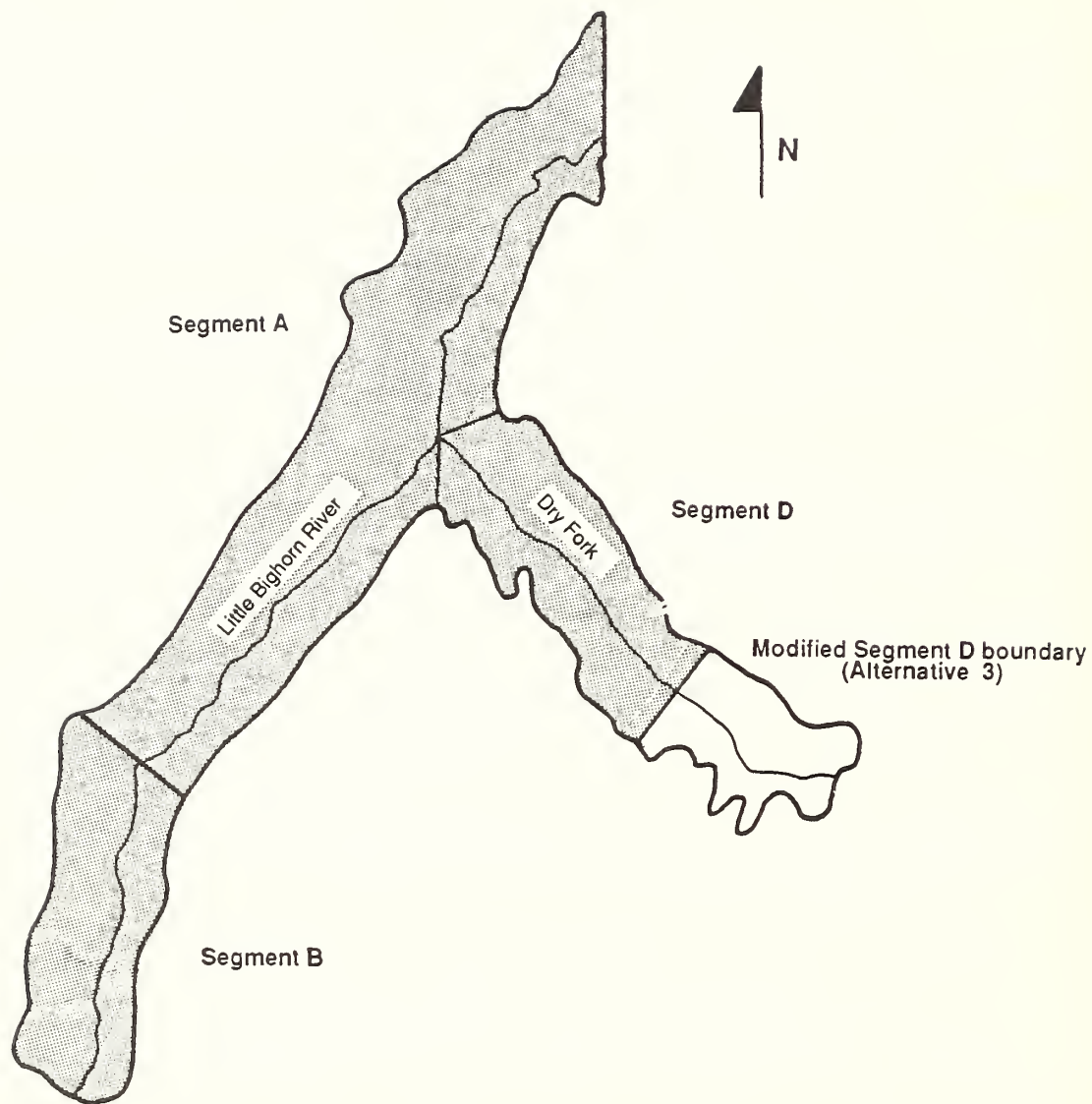
Alternative 3 was developed in response to comments received during the scoping process for this Study Report/EIS. The findings under Alternative 3 would be the same as under Alternative 2, except that the boundary of segment D would be moved 2.3 miles downstream on the Dry Fork (figure IV-2). Under Alternative 3, approximately 11,860 acres would be found suitable for inclusion in the Wild and Scenic River System and approximately 1,420 acres would be found unsuitable.

New mining claims and mineral leases and potential developments would be prohibited within one-quarter mile of the river.

Alternative 3 is a viable concept because some degree of reduced flows in upstream undesignated areas could be allowed while still protecting the wild and scenic values of the river corridor downstream. Section 7 of the Wild and Scenic Rivers Act and Forest Service Manual 2775.3 states that developments above or below a wild, scenic, or recreational river area will not be precluded where they do not invade the area or unreasonably diminish the scenic, recreational, and fish and wildlife values present in the area. Selection of this alternative would not imply that the proposed pumped storage project on the Dry Fork had been approved; rather, it would preserve the option for future consideration of the project. Future proposals for water or any other developments in the nondesignated area subsequently would be analyzed upon application from a project proponent. Such developments could occur upstream from the designated area provided that a subsequent project-specific environmental analysis demonstrates construction and operation to be compatible with management and values of the designated area. Instream flow requirements would be necessary in order to meet the objective of the Wild and Scenic Rivers Act to not unreasonably diminish the scenic, recreational, and fish and wildlife values. (See table IV-1.)

The management concerns, needed improvements, and costs for administering the areas found suitable under this alternative would be the same as under Alternative 2. Management area prescriptions 3B (Primitive Recreation) and 6B (Livestock Grazing) would be applied to the excluded portions of segment D.





The entire area shown would be included in the Wild and Scenic Rivers system under Alternative 2. Under Alternative 3, the unshaded area in Segment D would not be included in the system.

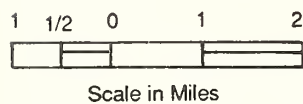


Figure IV-2--Alternatives 2 and 3



Table IV-2

## Summary of Environmental Consequences

Factors Considered	Alternative 1		
	Alternative 1 (No Action) Unsuitable for Designation Baseline Scenario	Unsuitable for Designation Pumped Storage Scenario <sup>1</sup>	Unsuitable for Designation Diversion Project Scenario <sup>1</sup>
Vegetation and Soil	No significant change from current environment.	Moderate impact to vegetation and soils in the project area. Vegetation and soils in reservoir areas would be permanently submerged.	Temporary minor impacts to narrow swath of vegetation and soil along pipeline pathway.
Fish and Wildlife	No significant change from current environment. Improvement of wildlife habitat in areas is managed under prescription 4B.	Potential short- and long-term effects on elk migration and grazing areas. The reservoirs would permanently displace wildlife. Wildlife would be disturbed in the short term by construction activities. Some portions of trout streams within the study area would be lost in the lower reservoir area. Water quality and impacts could affect aquatic habitat, but stream channel maintenance requirements and minimum flow requirements for fisheries would have to be met at all times.	Wildlife would be temporarily displaced from construction areas. Water quality and quantity impacts could affect aquatic habitat, but stream channel maintenance requirements and minimum flow requirements for fisheries would have to be met at all times.
Geology and Minerals	Potential for minerals is low. Mining would be allowed but only if conducted in a manner that minimizes surface disturbance, sedimentation, pollution, and visual impact.	Moderate impact in disturbed areas.	Minor impact in disturbed areas.

<sup>1</sup>These scenarios are not alternatives for analysis in this Study Report/EIS. Rather, they are presented to provide a summary of the general types of impacts and issues associated with pumped storage or diversion developments that may occur in the future under Alternative 1. The pumped storage scenario also would be possible under Alternative 3. If Alternative 1 or 3 is selected, site-specific impacts will be analyzed in a separate project-specific analysis if and when an application with project-specific data is received. The impacts of concurrent development would be the additive effects of both the pumped storage and diversion scenarios (see chapter 5).

Table IV-2 (continued)

## Summary of Environmental Consequences

Factors Considered	Alternative 1		
	Alternative 1 (No Action) Unsuitable for Designation Baseline Scenario	Unsuitable for Designation Pumped Storage Scenario <sup>1</sup>	Alternative Unsuitable for Designation Diversion Project Scenario <sup>1</sup>
Water Quantity and Quality	No impact. State and Federal in-stream criteria for water quality would apply. Water developments could be considered in the future, but decisions on permitting would be subject to a project-specific environmental analysis.	Changes in downstream water quality could occur, particularly during construction. While filling the reservoirs, flow rates would be lower than normal. Following reservoir filling, flow rates would be similar to preproject rates. State and Federal water quality criteria and stream channel maintenance requirements would apply at all times.	There could be changes in downstream water quality, particularly during construction. Flows would be reduced downstream of the diversion site. State and Federal water quality criteria and stream channel maintenance requirements would apply at all times.
Land Uses and Landownership	No significant change. All land in study area is federally owned. Rangeland would be improved in areas managed under prescription 6B.	Current land uses, including hiking, grazing, and wildlife habitat, would be precluded in submerged lower reservoir area (including part of West Pass Trail). The land would remain federally owned and managed.	Disturbances associated with construction of the pipeline could temporarily divert hikers and livestock from using that portion of the river corridor. The land would remain federally owned and managed.
Access	No significant change.	Access to the study area would increase through construction of new roads and improvement of existing roads.	Access to the study area may increase, depending on final project design.
Recreation	No significant change from current environment. Hiking, fishing, and hunting would continue to occur at the same use levels (approximately 12,000 recreation visitor days per year). Area would be managed for primitive and semiprimitive motorized and nonmotorized recreation.	No significant change from current overall use in the study area expected. Loss of trout stream in lower reservoir area would diminish fishing opportunities in the project area, but a lake fishery would be created. Big game hunting in the flooded areas would be precluded.	Only one segment of the trail area would be excavated at any one time. Hunting, fishing, and hiking opportunities would be slightly diminished in the construction area. Following completion of the project, recreation activities in this area should return to their prior levels.

Table IV-2 (continued)

Summary of Environmental Consequences

Factors Considered	Alternative 1		Alternative Unsuitable for Designation Diversion Project Scenario <sup>1</sup>
	Alternative 1 (No Action) Unsuitable for Designation Baseline Scenario	Unsuitable for Designation Pumped Storage Scenario <sup>1</sup>	
Historic and Cultural Resources	No significant change from current environment.	Historic and cultural resources could be affected adversely by construction and flooding the lower reservoir within the study area. The State Historic Preservation Office requires a survey before approval of a project and may require certain mitigation measures to protect the sites. Medicinal plant gathering and vision quests by Native Americans would be precluded in the flooded lands and be less appealing in the immediate project area.	Historic and cultural resources could be affected by pipeline construction. The State Historic Preservation Office requires a survey before approval of a project and may require certain mitigation measures to protect the sites. Use of the project area by Native Americans for plant gathering or vision quests would be precluded during construction.
Visual Resources	No significant change from current environment.	The natural scenery of the immediate project area would be permanently affected. The winding nature of Dry Fork and the mountainous terrain minimizes the extent of visual impact of the project.	Construction would temporarily diminish the scenic value of the land. Upon revegetation of the project area, the scenic values would be reestablished.
Socioeconomics	No significant change from current socioeconomic environment.	The project would generate a significant increase in the tax base and employment for Sheridan County. Several hundred construction workers are projected to be employed for several years, with fewer permanently employed.	Depending on final project design, up to 200 workers are projected to be involved in various aspects of the project for about 1 year. A few persons would be permanently employed as a result of the project. The income generated from the revenues depends on the ultimate use of the water stored in the reservoir.

Table IV-2 (continued)

Summary of Environmental Consequences

	Alternative 2 Designation of the Entire Study Area (19.2 Miles)	Alternative 3 Designation of 16.9 Miles (Preferred)
Vegetation and Soil	No significant change from current environment. No timber harvest would occur in the future within segments A and D, although some clearing in support of recreation use and to protect the environment could be done. Timber harvest could occur within segment B provided there is no substantial adverse effect on the river and its immediate environment. Grazing use within the corridor would be limited to the amount presently practiced.	Impacts would be similar to those described in Alternative 2 for segments designated as wild or scenic. Impacts within the non-designated segment would be similar to those described in Alternative 1 to those described in Alternative 1 baseline scenario or pumped storage scenario (should development occur). Before the approval of any projects in the nondesignated area, requirements of FERC, the Forest Service, and fish and wildlife agencies would have to be met by the project proponent, and it must be demonstrated that downstream wild and scenic values could be maintained before any project could be approved.
Fish and Wildlife	No significant change from current environment. Fish and wildlife values would continue to be protected in the future.	See above.
Geology and Minerals	New mining claims and mineral leases in segments A and D would be prohibited within 1/4 mile of the river. New claims and leases could be allowed in segment B. However, any mining operations must be conducted in a manner that minimizes surface disturbance, sedimentation, pollution, and visual impact and protects the wild and scenic values.	See above.

Table IV-2 (continued)

Summary of Environmental Consequences

	Alternative 2 Designation of the Entire Study Area (19.2 Miles)	Alternative 3 Designation of 16.9 Miles (Preferred)
Water Quantity and Quality	No significant change from current environment. The river would remain free flowing within the designated area. Water developments would be precluded from occurring within the designated area but could occur upstream from this area provided that a subsequent project-specific environmental analysis demonstrates construction and operation to be compatible with management and values of the designated area. Developments also could occur downstream from the National Forest boundary without jurisdiction by the Forest Service.	See above.
Land Uses and Landownership	No significant change from current environment. 13,280 acres and 19.2 river miles would be included in the Wild and Scenic Rivers System.	See above. 11,860 acres and 16.9 river miles would be included in the Wild and Scenic Rivers System.
Access	No significant change from current environment. Trailhead to the Little Bighorn Canyon would be improved.	See above.



Table IV-2 (continued)  
Summary of Environmental Consequences

	Alternative 2 Designation of the Entire Study Area (19.2 Miles)	Alternative 3 Designation of 16.9 Miles (Preferred)
Recreation	No significant change from current environment. Continued recreation use of the corridor would occur in the future. Hunting, fishing, and hiking are not expected to increase significantly above current use levels. Semiprimitive nonmotorized opportunities would be provided in segments A and D, and semiprimitive motorized and nonmotorized opportunities would be provided in segment B.	See above.
Historic and Cultural Resources	No significant change from current environment. Historic and cultural resource values would be protected in the future.	See above.
Visual Resources	No significant change from current environment. Visual resource values would be protected in the future.	See above.
Socioeconomics	No significant change from current environment. Potential for increased employment and income opportunities related to possible water developments could not occur.	See above.

## CHAPTER V

### Environmental Consequences

#### Overview

This chapter describes the environmental impacts of the three alternatives considered in this Study Report/EIS. Should all or part of the study area not be recommended for designation, there is the potential for future developments to be considered within the excluded portion of the river corridor. To consider the full range of reasonably foreseeable potential uses of the land and water, this chapter describes the general effects of potential water developments in the study area as well as effects of multiple-use management without water developments (as a baseline). Development scenarios and the baseline (nondevelopment) scenario described under Alternative 1 are not alternatives themselves; rather, they are analytical tools to aid in examining the full range of effects that may occur under a finding of unsuitability. The development scenarios are based conceptually on actual proposals for water projects in the study area, and the effects described are general in nature. Information about final project design and site-specific data for any proposed developments are not available at this time. Project-specific analysis of environmental and socioeconomic impacts or a determination of the economic or physical feasibility of a given project is beyond the scope of this Study Report/EIS.

It is important to note that the effects analyzed in this chapter relate to alternative decisions regarding the suitability of the study area for inclusion in the Wild and Scenic Rivers System, not to the approval or disapproval of specific projects within the area. If Alternative 1 is chosen, the Forest Service (and the Federal Energy Regulatory Commission, which requires a permit for certain water developments) will conduct a site-specific project analysis for each proposal upon application from the proponent. (No applications currently are pending with the Forest Service.) Full opportunities for public comment on specific projects will be provided during project-level environmental analysis.

#### Alternative 1 (No Action)—Unsuitable for Designation

##### Baseline Scenario

Under Alternative 1, the area would be managed under prescriptions 2A, 3B, 4B, 6A, and 6B, as described in chapter IV and illustrated in figure IV-1. The protected status provided under the 10D prescription would be removed, but, other than the potential for water developments (discussed in the following paragraphs), the uses of the area would not change significantly from current uses. The level of dispersed recreation use would remain relatively constant--current use is estimated by Tongue and Medicine Wheel District recreation specialists to be approximately 7,330 visits per year,

12,000 recreation visitor days (RVD's) per year.<sup>1</sup> Approximately 30 percent of this use is spring bear hunting with guns and fall general hunting with guns, 20 percent is spring bear and fall archery hunting, and the remainder is a combination of hiking, fishing, horseback riding, and camping.

Demand for dispersed recreation, as projected on page III-30 of the Bighorn National Forest Land and Resource Management Plan Final EIS, would be met in the river corridor and other areas throughout the Forest. Forest-wide demand for all forms of dispersed recreation during the period from 1986 to 1990 is projected to be 0.857 million RVD's annually (USDA, 1984). The capacity in areas allocated to dispersed recreation is projected to be 2.082 million RVD's annually during this period, well exceeding demand. The projected use of the Cloud Peak Wilderness may reach its capacity as the year 2000 approaches, but potential users of this area may seek primitive recreation opportunities elsewhere throughout the Forest. As noted in chapter IV, the Wyoming Wilderness Act of 1984 released the lands of the Bighorn National Forest outside of the Cloud Peak Wilderness to be managed for uses other than wilderness. However, the river corridor could continue to provide dispersed recreation (including primitive) opportunities.

Areas managed under prescription 3B within the river corridor would offer primitive recreation opportunities, and the number of people within these areas would be managed to minimize contacts with other users. The Forest Plan standards and guidelines for managing 3B areas call for trail and camp encounters during peak-use days to be less than six other parties per day. In other areas within the corridor, semiprimitive nonmotorized opportunities would continue to be available, and four-wheel-drive vehicles would continue to be allowed on Little Bighorn Road in segment B. Only nonmotorized use is allowed on the Little Horn Trail, and the Forest Service plans to allow only nonmotorized use on the Dry Fork Trail.

Table V-1 shows the estimated carrying capacity for the river corridor in RVD's per year in each of the three recreation settings provided in the corridor under Alternative 1. These capacity figures were derived using coefficients developed on pages III-29 and III-30 of the Forest Plan for regulating the number of persons in dispersed recreation areas at one time in a manner consistent with its desired condition. Although the theoretical maximum recreation carrying capacity is 51,000 RVD's, the effects of steep slopes, vegetation, other limitations on usability, and patterns of use reduce the practical recreation carrying capacity to considerably less than 51,000 RVD's. Detailed use adjustment factors have not been developed for the area. However, it is likely that the practical carrying capacity is half or less of the maximum theoretical capacity. Even so, it is not expected that actual use will change significantly from the current estimated level of 12,000 RVD's, which is well within the practical carrying capacity of the area.

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<sup>1</sup> Recreation visitor day (RVD) is defined as an aggregate of 12 hours of recreational use of the Forest. It may consist of one person for 12 hours, two people for 6 hours, or any combination of persons totaling 12 hours.

Table V-1

## Carrying Capacity for Dispersed Recreation--Alternative 1

Recreation Type	Acreage of Study Area	Maximum Theoretical Carrying Capacity (RVD's per year)
Primitive nonmotorized	10,294	21,617
Semiprimitive motorized	1,198	2,880
Semiprimitive nonmotorized	1,790	26,850
Total		51,347

Under the baseline scenario in Alternative 1 (which assumes that no water development occurs), there would be no significant effects on vegetation, soil, fish and wildlife, water, land use, visual resources, socioeconomics, or historical and cultural resources. Because the numbers of recreationists in the corridor would continue to be low under this alternative, the soil and water problems, man-induced fire risk, noise, and vandalism to cultural resources or adjacent lands that may occur from overuse are not expected. Wildlife habitat would be improved in areas managed under prescription 4B. Cover for elk and deer would be maintained. Elk and trout would be the indicator species used to monitor the continuing effects of multiple-use management on terrestrial and aquatic species within the corridor. Rangeland would be improved in areas managed under prescription 6B.

Specific projects, such as the water projects listed in table II-2 in chapter II, or other projects, such as mining and road building, that the Forest Service would not have approved while the area has been under study could occur but not until a project-specific environmental analysis was completed. Mining activities would be allowed, but only if conducted in a manner that minimized surface disturbance, sedimentation, pollution, and visual impact. The mineral potential for the area is low. In addition, specific management prescriptions that apply in the river corridor stipulate conditions for these activities that are designed to protect the resources emphasized in each management area (primitive recreation, wildlife habitat, grazing, and the like).

#### Pumped Storage Hydroelectric Facility Scenario

A pumped hydroelectric facility consists of an upper reservoir, a lower reservoir, connecting pipe, and a combination electric pump-turbine.



During periods of low electricity demand, water from the lower reservoir is pumped to the upper reservoir. During peak demand, the water is released from the upper reservoir, flows through the penstock, turns the turbine, and generates electricity. Although more energy is required to pump the water from the lower to the upper reservoir than is generated by gravity flow through the turbine, the off-peak demand price for electricity is substantially lower than the price during the peak demand periods, thus this type of operation could be economically viable.

Under this scenario, construction would occur for several years after the procurement of the necessary permits. The dam for this scenario would be located one-fourth mile downstream of the Dry Fork-Lick Creek confluence in segment D of the river corridor (figure V-1). The reservoir resulting from this dam would have a capacity of 30,000 acre-feet and a surface area of approximately 280 acres. The upper reservoir would be located on Dry Fork Ridge, outside the study area. This reservoir would have a capacity of approximately 10,000 acre-feet and a surface area of about 100 acres. An underground powerhouse of 1,000 megawatt capacity would connect the reservoirs by conduits. The intake outlet for the conduit would be located below the minimum water level for the lower reservoir. Powerlines could be above or below ground, depending on the final project design. Although some new access roads would be required for this project, the existing road network can be used to a large extent (figure V-1).

If a pumped storage hydroelectric facility were developed within the corridor under Alternative 1, a number of resource elements potentially would be affected. Current land uses within the corridor, including hiking, grazing, and wildlife habitat, would be precluded in the area that is submerged by the lower reservoir. Part of West Pass Trail would be submerged. Hikers, cattle, and horses, as well as game animals, currently use this trail.

The pumped storage scenario could have both short- and long-term effects on elk migration and elk grazing in the study area. A detailed analysis of impacts to elk (and other resources) would be conducted when and if a project-specific analysis is undertaken and when final design details and site-specific data are available.

Other wildlife would be disturbed in the short term by the effects of noise, dust, and human activities during construction. Permanent displacement of terrestrial wildlife in the reservoir areas would occur after the land was flooded.

Construction of a dam on the lower Dry Fork and pumped storage operations could cause changes in water quality with attendant effects on fish and other aquatic organisms several miles downstream.

Filling the reservoirs could take several years. The fill rate would be influenced primarily by the amount of snow received upstream from the project area and by leakage, evaporation, and the amount of water remaining after downstream flow requirements have been met. A high spring runoff is required to flush accumulated sediment from the stream. In addition, the consistency of flow rate fluctuations on a day-to-day basis would be

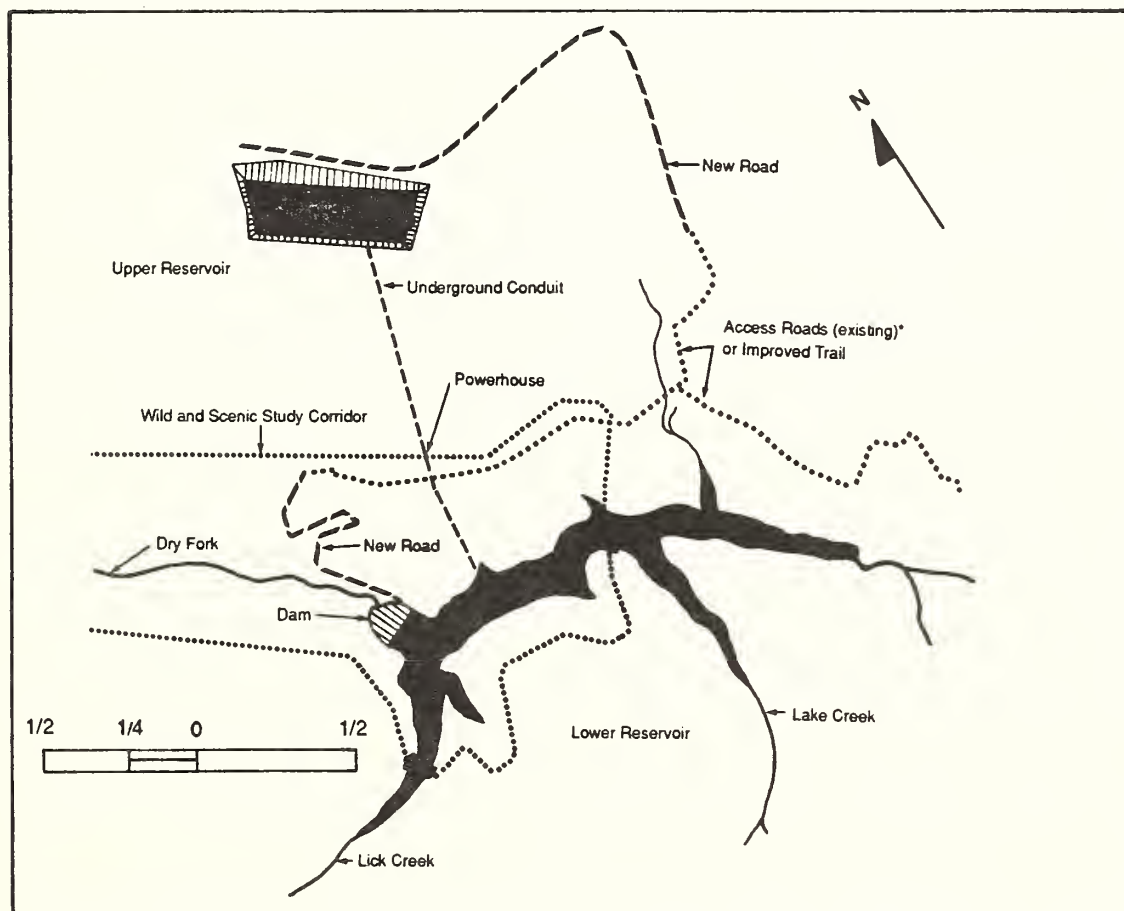
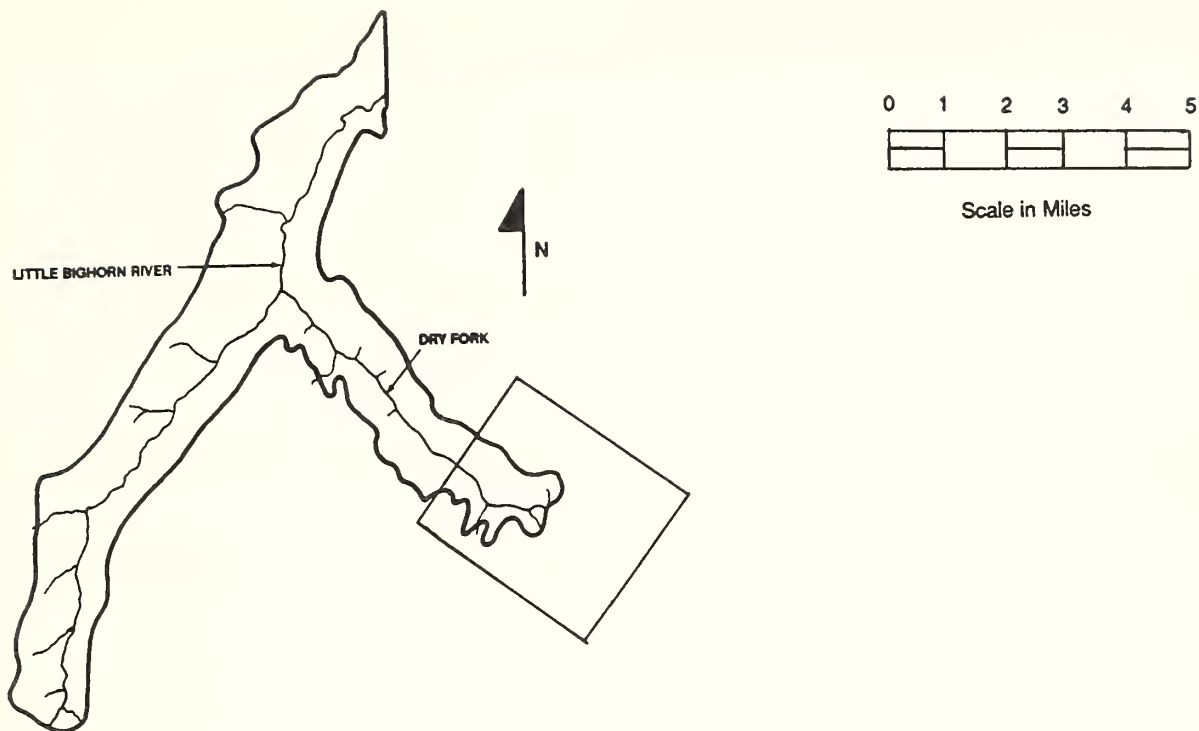


Figure V-1--Location and Schematic Diagram of Pumped Storage Project Scenario

important for the preservation of fish habitat and spawning grounds. Thus, the rate of reservoir filling would need to be decreased during dry periods to ensure that stream channel maintenance requirements and fish flow requirements are met. During actual operations, downstream water quantities should be similar to the flow rates before damming the Dry Fork. The flow rates would be dependent on seepage, evaporation, and precipitation rates.

Filling the reservoir would result in the inundation of segments of trout stream, vegetation, and soil resources at the lower elevations in the project area. The upper reservoir is located outside the study area on Dry Fork Ridge above several landslide areas.

The potential uranium mineralization area lies between the reservoirs, thus any possible uranium development would not be precluded under this scenario.

Access to the study area would be increased under this scenario because of the construction of new roads and improvement of existing roads. Although the upper reservoir would be fenced off from the public because of widely fluctuating levels, it may be possible for the public to use the lower reservoir for recreational purposes. The project area provides limited big game hunting and minimal fishing. Although these opportunities would be lost, dispersed recreation and outfitting trips elsewhere should not be impacted adversely under this scenario.

Historic and cultural resources could be affected adversely by constructing the project and flooding the reservoir areas. A memorandum of understanding between the U.S. Forest Service and the State Historic Preservation Office requires a survey, evaluation, and protection of significant historic and archaeological sites before any disturbance. In addition, the Crow Tribal Council will consult tribal members who have knowledge of historic sites if a development is proposed within sensitive areas so that the sites can be protected. The results of the survey and consultation could influence the viability of the project or require certain mitigation measures to protect these sites. The study area has been identified as important to Native Americans for medicinal plant gathering, opportunities for solitude, and vision quests. These activities would be precluded during construction and would no longer be as appealing in the immediate project area during operation, but opportunities would continue to be available elsewhere in the study area. The Medicine Wheel archeological site is approximately 17 miles west of the project area. Dry Fork Ridge (where the upper reservoir site is located) is visible from the Medicine Wheel. However, the reservoir itself should not be visible due to the distance between the two.

The winding nature of the Dry Fork and the steep terrain of the project area would minimize any visual impacts of the project. The project area would be visible only from certain viewpoints within the study area. The turbines used to generate power would be underground. The upper reservoir would be visible only from elevations higher than about 8,000 feet. The visual impacts of powerlines would depend on their location and final project design.

The project would result in a significantly increased tax base and employment opportunities for Sheridan County, Wyoming. Under the pumped storage scenario, several hundred workers would be employed for several years during the construction phase, and up to one-fourth of these workers (including facility operators, general office support staff, and construction/maintenance staff) would be employed permanently. The population of the county has declined over the last several years and is expected to decline further upon the closure of the Big Horn Coal Mine, a major local employer. Local labor would fill some of the positions for the project, but an influx of workers and their families would be required for the project. There could be increased costs and needs for additional public services associated with this influx and the project activities.

### Diversion Scenario

Under the conceptualized diversion scenario, the point of diversion along the Little Bighorn River would be located approximately 1.5 miles upstream from the Forest boundary (figure V-2). The project would require an underground pipeline 5 feet in diameter to carry 150 cubic feet per second ( $\text{ft}^3/\text{s}$ ). The pipeline would extend about 3 miles from the diversion point through the river corridor to a pumping station outside the Forest boundary. The piping would then extend to a reservoir outside the Forest. The firm yield through this supply would depend on instream flow requirements for fisheries and channel maintenance purposes.

A staged construction sequence of clearing, grading, excavating, pipeline construction, backfill, compaction, and revegetation would be expected to occur. It was assumed for this description that the road for construction equipment would be built over the completed pipeline so that the contractor always would be working ahead with the gravel road following behind.

Impacts of the diversion project within the river corridor would be primarily temporary and would involve moderate surface disturbance. Terrestrial wildlife would be displaced from the construction area as a result of noise and human activity. After the construction is completed, wildlife would again inhabit the project area.

A narrow swath of vegetation and soil would be disturbed during the construction process, but the soil would be replaced as the pipeline construction moved upstream. The Little Bighorn Trail currently travels over loose material eroded from the cliffs. Widening this trail near the river would have to be done carefully to avoid landslides. There could be changes in water quality and resultant effects on fish and aquatic organisms for several miles downstream. Impacts to these resource elements would be temporary after revegetating the downslope side of the road. As under the previous scenario, minimum fisheries flows and stream channel maintenance requirements would be designed to mitigate potential adverse impacts from the project.

Any uranium recovery would not be affected under this scenario.

Implementation of a diversion project would require that the management area prescription for this area, 3B (primitive recreation), be changed. Although only one segment of the trail area would be excavated at any one



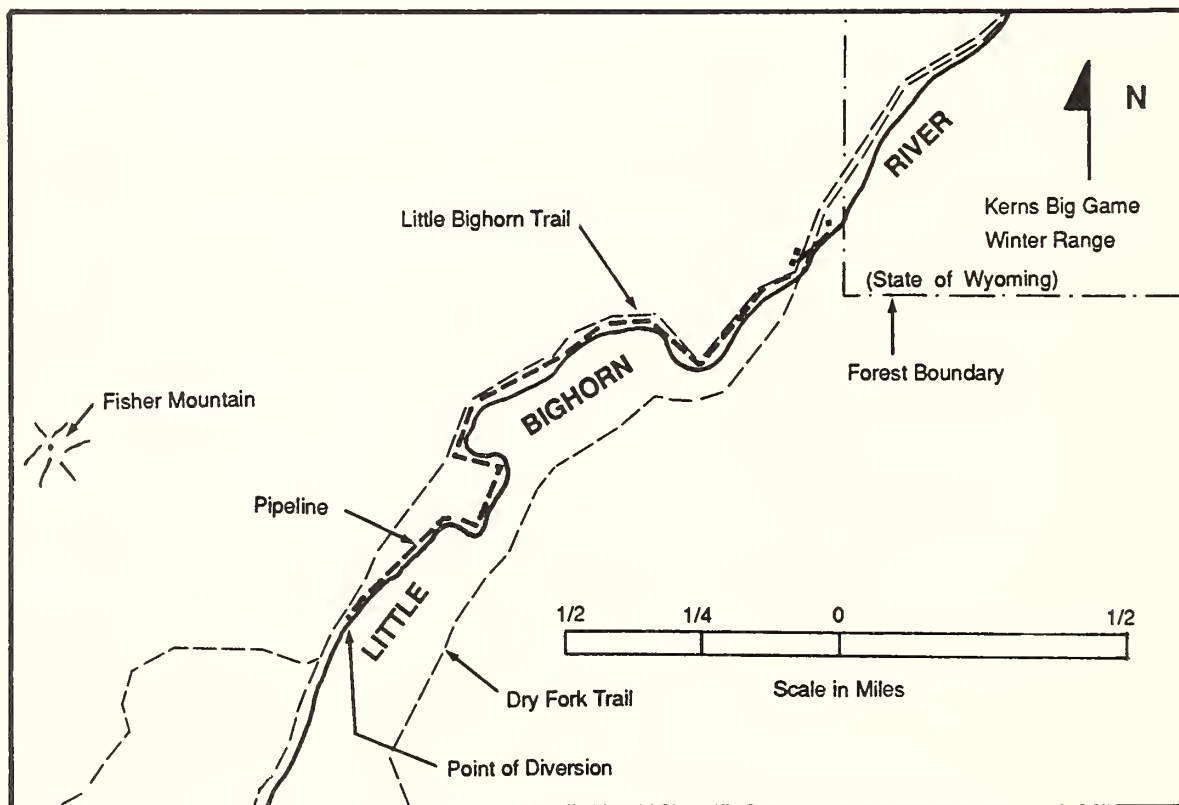
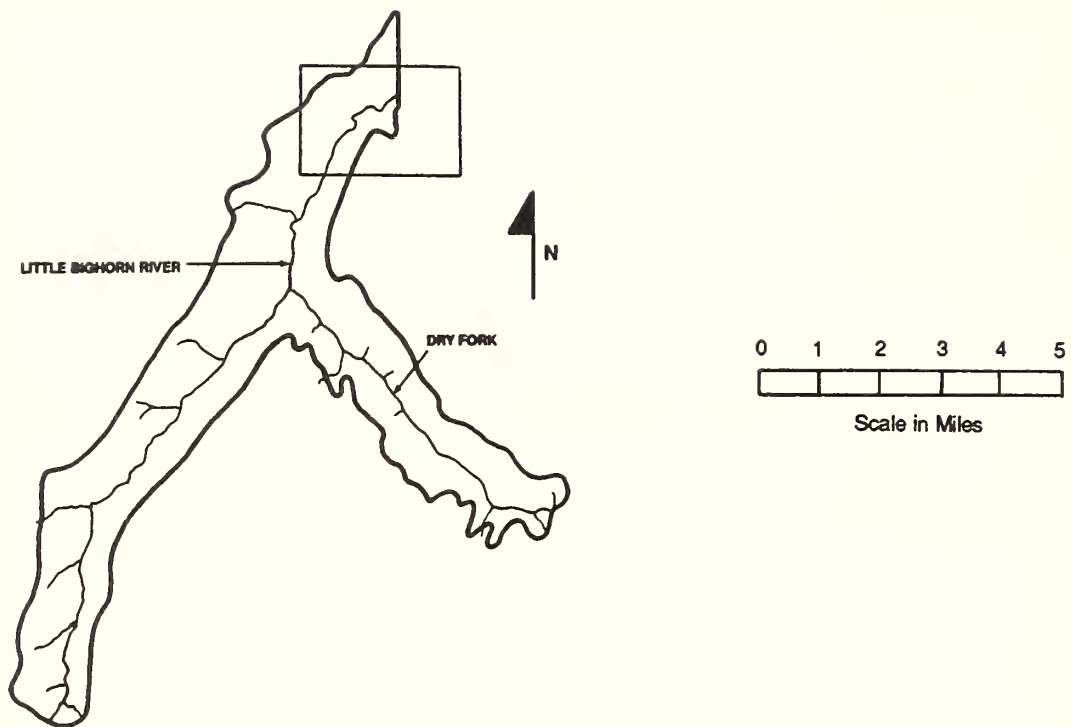


Figure V-2--Location and Schematic Diagram of Diversion Project Scenario

time under the diversion scenario, the construction period would represent an extended period when travel along the trail by hikers, hunters, anglers, and livestock would be difficult. After completing the pipeline within the corridor, the original land use would be restored. Construction would impact the scenic value of the land temporarily. After revegetating the project area, the scenic values would be reestablished.

Before the project begins, a qualified archeologist would survey the area to determine if any cultural or historic artifacts are present along the construction path. Based on the results of the survey, which would be reviewed by the State Historic Preservation Officer, construction could be rerouted, a delay in construction could be required to allow study of the artifacts, or cessation of the project could be required. Use of the project area by Native Americans for plant gathering or vision quests would be precluded during construction.

Depending on final project design, up to 200 workers would be involved in various aspects of the project (inside and outside the study area) for about 1 year. The jobs would be temporary, ending when construction was completed. A few persons would be employed permanently to operate the diversion project. It is assumed that the majority of the labor requirements would be met locally. The income generated for Sheridan County and the State by this kind of project would depend on the ultimate use of the water stored in the reservoir.

#### Concurrent Development Scenario--Cumulative Effects

Examination of the current levels of water use, average daily flow rates, and estimated demand for water under each scenario reveals the existence of potential problems for simultaneous water use by both projects. If one project has acquired water rights, the second project may not have enough water available both to maintain minimum flow rates to prevent unacceptable environmental impacts and to sustain an economically viable fill rate.

If the diversion project had senior water rights and used Little Bighorn water before the hydropower reservoirs began filling, more time would be required to fill the hydropower reservoirs to an adequate operational level. This extended filling period may be too long for a viable economic operation under the pumped storage scenario. Conversely, if filling the pumped storage reservoirs began before beginning the diversion project, the fill rate of the diversion scenario would be lengthened.

If the conceptualized pumped storage hydroelectric and diversion scenarios were able to operate concurrently, there would be greater cumulative areas of impact on vegetation, soil, wildlife, cultural and visual resources, and socioeconomics.

Because minimum flows for fisheries and for stream channel protection normally would have to be met before a second project could be permitted, the impacts on water quality and aquatic organisms should not be significantly greater than under the individual project scenarios.

Table II-2 in chapter II lists water projects for which permit applications have been filed with the State Engineer. Under Alternative 1, future

site-specific analysis of any project (including water development, roads, and so forth) would include consideration of the cumulative effects that would result from any other concurrent projects in the area.

## **Alternative 2—Designation of the Entire Study Area (19.2 Miles)**

Alternative 2 recommends the entire study area for designation as part of the Wild and Scenic Rivers System. Segments A and D would be classified wild, and segment B would be classified scenic. The management activities that would occur under this alternative are described in chapter IV.

A finding of suitability under this alternative would afford protection of water flows, cultural values, wildlife, scenic, and other natural values of this area from the potential effects of developments that could occur under no action. These include effects on elk migration routes, localized effects on wildlife habitat and grazing areas, changes in water quality, and potential impacts to cultural uses by Native Americans.

Some public commentors who support designating the river as part of the system emphasized the stability of the recreational benefits and increased tourism potential that a wild and scenic designation may provide. They stressed the potential for a boom/bust cycle that a hydroelectric construction workforce may create if the area is found unsuitable and a water development project is approved. Others who perceived a potential for increase in recreation use of the corridor if it is designated as part of the system were concerned about the ecological effects of increased use and the potential for intrusion on adjacent private and Indian lands.

To evaluate the potential for changes in levels of recreation use and the resultant environmental and socioeconomic effects if the area is designated, land managers for other National Forests and the National Park Service were contacted regarding the effects of designation on use levels of rivers under their jurisdiction. Although no agency maintains use-level statistics specifically for river areas, the land managers indicated that designation into the system has not resulted in noticeable increases in use for rivers that are not floatable and that are not located near large population centers.

For example, use levels on the Rapid River corridor in Idaho by hikers, hunters, and fishermen have not increased appreciably since the time of its inclusion in the Wild and Scenic Rivers System in 1975. It is estimated that use of the 31-mile segment of the Rapid River is approximately 1,000 RVD's per year (oral communication, Al Laper, Recreation staff, Nez Perce National Forest, USDA Forest Service, September 21, 1987). Like the Little Bighorn study area, the Rapid River segment is generally inaccessible except by trail, is unnavigable, and is classified wild.

The segment of the Horsepasture River in North Carolina (designated in 1986) that is included in the system is not generally floatable, with the exception of a stretch of natural water slides that is easily accessible from a pull-off point on a local road. The already heavily used water slides were used even more heavily after the designation, but use of the

less accessible, unnavigable portions of the Horsepasture that were designated have not changed noticeably (oral communication, Melinda Waldrep, Recreation staff, National Forests in North Carolina, USDA Forest Service, September 23, 1987).

The increases in use that have occurred in popular white water rivers in the system, such as the Chattooga in the South and the Snake in the West, are attributed to heavy promotion by commercial outfitters or media events.

Use levels are not projected to increase significantly above 12,000 RVD's per year under this alternative because the Little Bighorn study area is not floatable, because the projected demand probably will be met through the allocations of areas to dispersed recreation throughout the Forest, and because of the relatively low levels of current use of the area. Use of the area will be monitored to ensure that the wild and scenic characteristics of the river are maintained. The area would be managed to ensure that visitors have low to moderate contact with other groups or individuals (no more than 30 parties per day encountered during peak-use days). Based on carrying capacity coefficients developed for semiprimitive nonmotorized recreation developed in the Forest Plan, the theoretical maximum recreation carrying capacity is 198,930 RVD's. However, the effects of steep slopes, vegetation, other limitations on usability, and patterns of use reduce the practical recreation carrying capacity to considerably less than this amount. Detailed use adjustment factors have not been developed for the area. However, it is likely the practical carrying capacity is half or less of the maximum theoretical capacity. Even so, it is not expected that actual use will change significantly from the current estimated level of 12,000 RVD's, which is well within the practical carrying capacity of the area. The carrying capacity under this alternative is actually higher than under Alternative 1 because the area would be managed as primitive under Alternative 1.

Because use of the river corridor is not expected to increase appreciably under this alternative, there would be minimal effects on vegetation, soil, fish and wildlife, water, adjacent land uses, visual resources, socioeconomics, or historical and cultural resources. The major difference between this alternative and Alternative 1 is that this alternative precludes the possibility of developments in the river corridor and the attendant potential impacts to migrating elk, the free-flowing characteristics of the river, water quality, and cultural uses of the area described under the development scenarios. Conversely, the potential for increased employment and income opportunities associated with potential developments in the area would be eliminated under this alternative. None of the water projects within the corridor listed in table II-2 in chapter II would be available for further consideration under this alternative. Such developments could occur upstream from the designated area provided that they are compatible with the values of the designated area and that instream flow requirements, as described in chapter IV, are met.

Downstream from the two USGS gauging stations, other tributaries adding volume to the river system would tend to dilute the effects of potential consumptive uses of water upstream. For example, if the maximum allowable amount of water is withdrawn upstream of the wild and scenic river corridor on both the Dry Fork and Little Bighorn River, there would be an



approximate 8 to 12 percent reduction in volume downstream at the Forest boundary. This relatively small percentage change would not be noticeable to most observers.

A wild and scenic river designation would have no effect on project proposals downstream from the designated river segment.

### **Alternative 3—Designation of 16.9 Miles (Preferred Alternative)**

Under Alternative 3, the boundary of segment D would be moved 2.3 miles downstream from the boundary defined in Alternative 2. Approximately 16.9 river miles, covering 11,860 acres of the study area, would be recommended for designation; and 2.3 river miles, covering 1,420 acres, would be found unsuitable. Under this alternative, approximately 89 percent of the study area would be recommended for designation. During scoping, many public commentors viewed this alternative as a means of satisfying competing desired uses for the river corridor. However, other commentors were concerned that any potential water development on the Dry Fork would impair the natural values downstream to the point that a development on the Dry Fork and designation of the remaining area would be incompatible. The types of effects and issues associated with a finding of unsuitability on the upper end of the Dry Fork are covered under the baseline and pumped storage scenarios under Alternative 1, and the effects of a wild and scenic river designation on the remainder of the corridor are addressed under Alternative 2.

Recreation use levels are not projected to increase above the current estimated 12,000 RVD's of use per year in the designated portions of the corridor. There would be minimal effects on vegetation, soil, fish and wildlife, water, adjacent land uses, visual resources, or historical and cultural resources in the areas included in the system. No water development could occur in the designated areas. The undesignated portion of segment D would be managed for primitive recreation (prescription 3B) and livestock grazing (prescription 6B).

The option for future consideration of development proposals in the upper end (nondesignated portion) of the Dry Fork would be preserved under Alternative 3. Potential impacts of water development include effects on land uses, vegetation, and soil in the project area, effects on elk migration routes, localized effects on wildlife habitat and grazing areas, changes in water quality, and impacts on historical and cultural resources. There would be potential for significantly increased employment and income opportunities under this alternative. The Forest Service would not permit any development on the Dry Fork unless a detailed site-specific analysis and development of mitigation measures by all involved agencies indicated that the desired downstream value and condition of the land could be maintained. This includes provisions for maintaining instream flows for stream channel maintenance and visual quality consistent with a wild classification.

Under Alternative 3, less of the eligible area would be protected and available as a wild and scenic area, but the potential economic benefits

associated with a water development on the Dry Fork would remain an option for future consideration. The other water developments listed as having permit applications on file in table II-2 in chapter II would no longer be available for further consideration. Water developments could occur upstream from the designated area provided the projects are compatible with the values of the designated area and instream flow requirements are met, as discussed previously. Given these instream flow requirements, changes in downstream volume should not be noticeable to most visitors.

As the preferred alternative, Alternative 3 maximizes public net benefits in an environmentally sound manner, as required in the National Forest Management Act, 36 CFR 219.1(a). The preferred alternative calls for protecting 16.9 miles of the Little Bighorn River for use as a wild and scenic river, while preserving the option for future consideration of development proposals in the remainder of the study area. It is important to remember that the choice of this alternative would not imply that any water development necessarily would be approved; that decision would be the subject of a future project-specific environmental analysis.

## Other Environmental Effects

### Adverse Environmental Effects That Cannot Be Avoided

Given the forest management standards and guidelines that would apply under Alternative 1 and the statutory protection that would apply under Alternatives 2 and 3, there should be no significant unavoidable adverse effects under any of the alternatives. If Alternative 1 or 3 is chosen and if specific projects are proposed for the area, site-specific unavoidable impacts and mitigation measures would need to be considered before approval or denial of the project by the Forest Service and other Federal or State agencies.

### Local Short-Term Uses of the Environment and the Maintenance and Enhancement of Long-Term Productivity

Under the baseline scenario under Alternative 1 and under Alternative 2, current output levels and uses of the area would be expected to continue and management activities would continue to ensure that long-term productivity of the wildlife habitat, soil, water, grazing land, and other resources in the study area is protected. Short-term uses that could occur under the development scenarios under Alternative 1 or under Alternative 3 would provide increased electric power or water supply, economic growth, and employment opportunities, as well as result in short- and long-term ecological alterations in the project areas. If a water development or any other development project (such as road building) were to be proposed in the study area, potential effects on long-term productivity would be examined in a site-specific analysis.

### Irreversible and Irretrievable Commitments of Resources

Under the baseline scenario in Alternative 1 and under Alternative 2, there would be no irreversible or irretrievable commitment of resources in the

study area. If Alternative 1 or 3 were implemented, irreversible and irretrievable commitments of resources would be identified on a project-specific basis. For example, inundation of land for a reservoir would represent an irretrievable commitment of terrestrial wildlife habitat and stream habitat in that area.

### Other Effects

Neither the baseline scenario under Alternative 1 nor any part of Alternative 2 would have unmitigated effects on energy requirements, conservation potential, urban quality, historic or cultural resources, or the design of the built environment. No conflicts with Federal, regional, State, or local land use plans would occur under these alternatives.

By design, the pumped storage project scenario in Alternative 1 or one that could occur under Alternative 3 would consume 1.4 times more energy than it would generate (during hours when the energy would be cheaper). Any development on the Forest would be designed to be compatible with Federal, State, and local land use plans.

## **CHAPTER VI**

### **List of Agencies, Organizations, and Individuals to Whom Copies of the Study Report/EIS Are Sent**

Copies of the draft Study Report/EIS have been sent to, and comments have been requested from, the following:

#### **Federal Agencies and Officials**

Advisory Council on Historic Preservation, Office of Architectural and Environmental Protection, Washington, DC  
Army Corps of Engineers, Washington, DC  
Bighorn Canyon Recreation Area, National Park Service, Fort Smith, MT  
Bureau of Indian Affairs, Aberdeen Area Office, Aberdeen, SD  
Bureau of Indian Affairs, Billings Area Office, Billings, MT  
Bureau of Land Management, Cheyenne, WY  
Environmental Protection Agency, Denver, CO  
Environmental Protection Agency, Office of Federal Activities, Washington, DC  
Federal Energy Regulatory Commission, Advisor on Environmental Quality, Washington, DC  
Honorable Richard Cheney, U.S. Representative from Wyoming  
Honorable Alan Simpson, U.S. Senator from Wyoming  
Honorable Malcolm Wallop, U.S. Senator from Wyoming  
National Park Service, Denver, CO  
Rural Electric Administration, Washington, DC  
U.S. Department of Housing and Urban Development, Office of Environment and Energy, Washington, DC  
U.S. Department of the Interior, Office of Environmental Project Review, Washington, DC  
U.S. Fish and Wildlife Service, Billings, MT  
Water Resources Council, Washington, DC

#### **State and Local Agencies and Officials**

Board of Commissioners, Big Horn County, Basin, WY  
Board of Commissioners, Big Horn County, Hardin, MT  
Board of Commissioners, Sheridan County, Sheridan, WY  
Honorable Rex Arney, Wyoming State Senator, Sheridan, WY  
Honorable Art Badgett, Mayor of Dayton, Dayton, WY  
Honorable Max DeBolt, Mayor of Sheridan, Sheridan, WY  
Honorable Lynn Dickey, Wyoming State Representative, Sheridan, WY  
Honorable Della Herbst, Wyoming State Senator, Sheridan, WY  
Honorable Frank Hinckley, Wyoming State Senator, Shell, WY  
Honorable Allan Howard, Wyoming State Representative, Burlington, WY  
Honorable Jerry Laya, Mayor of Ranchester, Ranchester, WY



Honorable Carroll Miller, Wyoming State Representative, Greybull, WY  
Honorable John Nickle, Mayor of Lovell, WY  
Honorable Jim Perkins, Wyoming State Representative, Sheridan, WY  
Honorable Ted Schwinden, Governor of Montana  
Honorable Mike Sullivan, Governor of Wyoming  
Honorable Hardy Tate, Wyoming State Representative, Sheridan, WY  
Montana State Planning Coordinator, Helena, MT  
Wyoming State Planning Coordinator, Cheyenne, WY  
Yellowstone River Compact Commission, Bismarck, ND

## **Indian Tribes**

Arapaho Tribal Council, Fort Washakie, WY  
Blackfeet Tribal Council, Browning, MT  
Crow Tribal Council, Crow Agency, MT  
Northern Cheyenne Tribal Council, Lame Deer, MT  
Oglala Sioux Tribal Council, Pine Ridge, SD  
Shoshone Tribal Council, Fort Washakie, WY

## **Organizations**

American Rivers, Washington, DC  
American Wilderness Alliance, Englewood, CO  
Big Horn Audubon Society, Sheridan, WY  
Big Horn Economic Development Council, Buffalo, WY  
Big Horn Forest Users Coalition, Sheridan, WY  
Big Horn Home Builders Association, Sheridan, WY  
Bighorn Mountain Flyfishermen, Sheridan, WY  
Ethnoscience, Billings, MT  
High Plains Alliance, Sheridan, WY  
National Audubon Society, Boulder, CO  
National Audubon Society, Washington, DC  
The Nature Conservancy, Fort Collins, CO  
Northeast Wyoming Wildlife Federation, Cheyenne, WY  
Northern Plains Office, Sierra Club, Sheridan, WY  
Northwest Federation of Mineralogical Societies, Billings, MT  
Petroleum Association of Wyoming, Casper, WY  
Powder River Basin Resource Council, Sheridan, WY  
Rocky Mountain Elk Foundation, Troy, MT  
Rocky Mountain Oil and Gas Association, Denver, CO  
Sheridan Chamber of Commerce, Sheridan, WY  
Sheridan County Board of Realtors, Sheridan, WY  
Sheridan County Economic Development Council, Sheridan, WY  
Sheridan County Sportsmen Club, Sheridan, WY  
Sheridan County YMCA, Sheridan, WY  
Sheridan Horse Patrol, Sheridan, WY  
Sheridan Main Street Program, Sheridan, WY  
Trout Unlimited, Vienna, VA  
The Wilderness Society, Bozeman, MT  
Wyoming Chapter, Sierra Club, Kaycee, WY

Wyoming Heritage Society, Casper, WY  
Wyoming Outfitters Association, Buffalo, WY  
Wyoming Public Lands Council, Casper, WY  
Wyoming Wildlife Federation, Cheyenne, WY

## **Business/Industry**

Fuller Water Project, Parkman, WY  
Little Horn Water Group, Sheridan, WY  
Wyoming Sawmills, Inc., Sheridan, WY

## **Schools/Libraries/Institutions**

Big Horn County Public Library, Basin, WY  
Big Horn County School District One, Lovell, WY  
Big Horn County School District Three, Greybull, WY  
Campbell County Public Library, Gillette, WY  
Greybull Public Library, Greybull, WY  
Johnson County Public Library, Buffalo, WY  
Lovell Public Library, Lovell, WY  
Powell Public Library, Powell, WY  
Ranchester Branch Library, Ranchester, WY  
Sheridan College, Sheridan, WY  
Sheridan County Fulmer Public Library, Sheridan, WY  
Sheridan County School District One West, Sheridan, WY  
Sheridan County School District Two, Sheridan, WY  
Story Branch Library, Story, WY  
University Library, University of Wyoming, Laramie, WY  
University of Wyoming, Laramie, WY  
Washakie County Public Library, Worland, WY

## **Individuals**

Copies of the draft Study Report/EIS will be sent to individuals who submitted comments during scoping and/or who requested a copy.



## CHAPTER VII

### List of Preparers

<u>Name</u>	<u>Project Responsibility</u>	<u>Education</u>
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John Nesser	Interdisciplinary Team Member, Soils and Hydrology Supervisor's Office, Bighorn National Forest	M.S., Resource Management (Soil Science); B.S., Geography, University of Wisconsin--Stevens Point
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**Contractor: LABAT-ANDERSON Incorporated**

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Tedi McManus	Wildlife Biologist	M.A., Wildlife Ecology, Southern Illinois University; B.S., Wildlife Resources, West Virginia University
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of Maryland

Pamela Allen Graphics Artist

B.F.A., Design, Howard  
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Southern Illinois  
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## CHAPTER VIII

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